



MISSOURI NONPOINT SOURCE MANAGEMENT PLAN

***UPDATE
2020-2025***

The Missouri Nonpoint Source Management Plan provides the state strategies for addressing nonpoint source pollution pursuant to Section 319 of the federal Clean Water Act.

This plan is intended to serve as a voluntary tool for assisting stakeholders with the nonpoint source challenges and issues facing Missouri.

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PHOTO CREDITS

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Cover Page: Descriptions of the photos are listed in order from top to bottom: Sunset on Mark Twain Lake, Trout fishing at Montauk State Park and Agricultural field in Pettis County.

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EXECUTIVE SUMMARY

The mission of the Missouri Nonpoint Source Implementation Program is to: *“Protect and improve the quality of the state’s water resources using locally led approaches to address nonpoint source pollution impairments.”* The Missouri Nonpoint Source Management Plan (MNPSMP) provides the state strategies for addressing NPS pollution pursuant to §319 of the federal Clean Water Act (CWA). This plan is intended to serve as a voluntary tool for assisting stakeholders with the nonpoint source (NPS) challenges and issues facing Missouri. By implementing strategies to achieve NPS goals, objectives, and milestones, this plan will enhance protection and restoration of Missouri waters resources. The MNPSMP goals, objectives, and strategies are discussed in Chapter 7. Table 14 provides the goals, objectives, measures and outcomes, timeframe, funding source and partner support for each objective.

In 2012, the Missouri Department of Natural Resources (Department) launched a statewide watershed planning effort to strategically address local water resource issues. The 66 eight-digit Hydrologic Unit Codes (HUC-8) were ranked using a series of criteria. This ranking process allowed the state to prioritize watersheds for planning and implementation (Tables 7 and 8). The watershed planning and implementation efforts are locally led by a single entity (e.g. watershed groups, local governments) who coordinates and partners with others in the watershed to develop a holistic approach for protecting and improving the water resources (Appendix 3). Through these partnerships, landowners, communities, industries, and local leaders work together to share information and set priorities for a watershed. Once a watershed plan is developed and accepted by the Department and U.S. Environmental Protection Agency (EPA), financial resources are available for the voluntary implementation of various land management practices to protect high quality resources (Tables 9 through 12) or address water quality impairments or concerns.

Measures of success will be measured by outputs such as the number of watershed planning documents developed, actions identified and prioritized, and actions implemented. Over time as more actions are implemented the focus of performance measures will shift to outcomes such as reductions in nonpoint source (NPS) pollutant loads and delisting of waterbodies impaired by NPS. The ultimate goal is to report NPS success stories where water quality improvements have been documented (Table 13).

The MNPSMP is a five-year action plan that incorporates the most recent EPA guidance, Nonpoint Source Program and Grants Guidelines for States and Territories, April 12, 2013 (<https://www.epa.gov/sites/production/files/2015-09/documents/319-guidelines-fy14.pdf>) and Section 319 Program Guidance: Key Components of an Effective State Nonpoint Source Management Program November 2012 (https://www.epa.gov/sites/production/files/2015-09/documents/key_components_2012.pdf). The Department intends to review and update the MNPSMP at least once every five years.

It is important to emphasize CWA §319 does not place limits on NPS pollution nor is there an enforcement mechanism.

TABLE OF ACRONYMS

ACEP	Agricultural Conservation Easement Program	MRBI	Mississippi River Basin Healthy Watersheds Initiative
BMP	Best Management Practice	NEPA	National Environmental Policy Act
CAM	Collaborative Adaptive Management	NPS	Nonpoint Source
CFR	Code of Federal Regulations	NRCS	Natural Resources Conservation Service
CSI	Cooperative Stream Investigation	NWQI	National Water Quality Initiative
CWA	Clean Water Act	OEWR	Ozark Environmental Water Resources Institution
DEQ	Division of Environmental Quality	OWOW	Office of Wetlands, Oceans and Watersheds
DHSS	Department of Health and Senior Services	PAH	Polycyclic Aromatic Hydrocarbons
DO	Directors Office	PDWB	Public Drinking Water Branch
EHU	Environmental Health Unit	PPG	Partnership Performance Grant
EPA	U.S. Environmental Protection Agency	QAPP	Quality Assurance Project Plan
ESP	Environmental Services Program	RAM	Resource Assessment and Monitoring
EQIP	Environmental Quality Incentives Program	RCPP	Regional Conservation Partnership Program
FAC	Financial Assistance Center	RFP	Requests for Proposal
FEMA	Federal Emergency Management Agency	SLAP	Statewide Lakes Assessment Program
GAAP	Generally Accepted Accounting Principles	SRF	State Revolving Fund
GPR	Green Project Reserve	SSTF	Stream Stewardship Trust Fund
GRTS	Grants Reporting and Tracking System	SWCP	Soil and Water Conservation Program
HAB	Harmful Algal Bloom	SWP	Source Water Protection
HUC	Hydrologic Unit Code	SWPP	Source Water Protection Program
LMD	Listing Methodology Document	TMDL	Total Maximum Daily Load
LMVP	Lakes of Missouri Volunteer Program	UAA	Use Attainability Analysis
LRP	Land Reclamation Program	UMRBA	Upper Mississippi River Basin Association
MARB	Mississippi River/Atchafalaya Basin	USACOE	U.S. Army Corps of Engineers
MAU	Monitoring and Assessment Unit	USDA	U.S. Department of Agriculture
MCHF	Missouri Conservation Heritage Foundation	USFWS	U.S. Fish & Wildlife Service
MDA	Missouri Department of Agriculture	USGS	U.S. Geological Survey
MDC	Missouri Department of Conservation	USFS	U.S. Forest Service
MGS	Missouri Geological Survey	USNPS	U.S. National Park Service
MoDNR	Missouri Department of Natural Resources (Department)	VWQM	Volunteer Water Quality Monitoring
MNPSMP	Missouri Nonpoint Source Management Plan	WBP	Watershed-Based Plan
MNRSC	Missouri Nutrient Reduction Strategy Committee	WPF	Water Protection Forum
MoDOT	Missouri Department of Transportation	WPP	Water Protection Program
		WQA	Water Quality Assessment
		WQS	Water Quality Standards
		WQX	Water Quality Exchange
		WRC	Water Resource Center

MISSION STATEMENTS

The Department

Protects our air, land, water and mineral resources; preserves our unique natural and historic places; and provides recreational and learning opportunities; while promoting the environmentally sound and energy-efficient operations of businesses, communities, agriculture, and industry for the benefit of all Missourians.

The Section 319 Nonpoint Source Implementation Program

Protect and improve the quality of the state's water resources using locally led approaches to address nonpoint source impairments.

ACKNOWLEDGEMENTS

The Department appreciates the time, efforts and the feedback that were provided by key partners and stakeholders. Below is list of individuals who participated in the meetings and provided essential comments and suggestions for the five-year update.

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CHAPTER 1: MISSOURI NONPOINT SOURCE MANAGEMENT PLAN

The 1987 amendments to the Clean Water Act (CWA) established the national Section (§) 319 Nonpoint Source Management Program¹ to address the need for greater federal leadership to help focus state and local nonpoint source (NPS) efforts. Under the CWA §319, states, territories and tribes receive grant funds to support a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to help ensure the success of NPS implementation projects.

History of the Clean Water Act Section 319 Program

In 1979, prior to the federal requirement for states to develop NPS management plans, a Missouri Water Quality Management Plan (§208 plan) was developed by the Department pursuant to §208 and §303 of the CWA. Planning was performed through a cooperative effort between the Department, East-West Gateway Coordinating Council, Mid-America Regional Council and Lake of the Ozarks Council of Local Governments². The §208 plan outlined the actions needed to protect the quality of surface waters and groundwater in Missouri, including control of both point and nonpoint sources of pollution. Municipal wastewater planning was completed and future needs were identified. Nonpoint sources were assessed regarding the magnitude of water quality problems, and solutions were proposed. Federal regulations required §208 plans to consider NPS pollution from construction, mining, silviculture, and agriculture; however, designated areas identified in the Missouri §208 plan did not address agriculture based on a state task force recommendation. Instead, agricultural needs were addressed on a statewide basis. The CWA §208 was essentially a federal funding mechanism for state programs that attempted to address NPS pollution. It created a provision that directed states to determine whether regulatory point source controls were needed. However, CWA §208 was significantly underfunded and all available funds were expended by 1980. Many considered the CWA §208 planning efforts a failure because they did little to actually reduce NPS pollution.³ According to Szalay (2010)⁴, “The section placed full control over regulation of NPS water pollution with the states and did not provide any mechanisms to actually control NPS water pollution.”

In 1987, in response to the limited success of CWA §208 in addressing NPS water pollution, Congress passed the Water Quality Act and created the CWA §319 to focus on NPS pollution. CWA §319 requires states to identify water bodies that cannot meet water quality standards (WQS) without control of nonpoint sources and to develop strategies and implementation plans that identify best management practices (BMPs), measures of success and milestones for remediating NPS impaired waters. Acceptance of these plans by the EPA was required before states could receive §319 grant funds to implement their NPS management plans. The NPS

¹ Sec. 319 [33 U.S.C 1329] [Nonpoint Source Management Programs](#)

² <http://macog.org/regional-council-rpcs/>

³ [Agriculture, Nonpoint Source Pollution, and Federal Law.](#) *U.C. Davis Law Review* 23: 461

⁴ [Breathing life into the dead zone: Can the federal common law of nuisance be used to control nonpoint source water pollution?](#) *Tulane Law Review* 85: 215–246.

management plans must be developed in accordance with EPA's Eight Key Components of an Effective State Nonpoint Source Management Program (Appendix 1).

The Water Quality Act of 1987 states: "It is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution." Pursuant to the requirements of §319 of the federal Water Quality Act of 1987, the Department was designated by the governor to develop the Missouri Nonpoint Source Management Program, hereafter referred to as the §319 NPS Program. Coordination among agencies was recognized as a key component for successful development and implementation of Missouri's §319 NPS Program, particularly among those agencies with funding for implementing voluntary conservation and other land management practices.

It is important to emphasize CWA §319 does not place limits on NPS pollution nor is there an enforcement mechanism. A portion of the §319 NPS grant funds received by the state are passed through as competitive subgrant awards to eligible entities to support a variety of statewide and locally led activities that address NPS issues. The other portion supports the administrative requirements of the grant, along with a variety of other Department NPS activities discussed in more detail below.

History of Missouri Nonpoint Source Management Plan

The Missouri Nonpoint Source Management Plan (MNPSMP) was first accepted by EPA in 1988, with subsequent minor and significant revisions accepted in 1996 and 2000, respectively. Additional minor revisions to individual sections were accepted by EPA in 2001, 2002, 2003 and 2004. In 2005, the accepted revisions were more complex and described the EPA eight key components of an effective NPS pollution plan.

Following the 2005 revisions, the Department deliberated on potential revisions to the MNPSMP. These considerations included:

- Determining which watershed prioritization methods should be used.
- Concentrating projects in a single watershed versus statewide or regional watershed projects.
- Reducing or increasing the amount of funds allocated for pass-through subgrant projects.
- Relying less on §319 NPS grant funds and more on state cost-share funds to implement agricultural conservation and management practices.
- Using Department-provided water quality monitoring versus subgrantee or contractor water quality monitoring.
- Avoiding duplication of state and federal cost-share funding strategies to fund practices that typically are not covered by other incentive programs.
- Determining how long to allocate §319 grant funding to individual watershed projects and how much money should be provided.
- Determining what percentage of §319 grant funding should be focused on urban and other non-agricultural projects.
- Determining what percentage of §319 grant funding should be focused on water quality

protection efforts versus NPS pollution restoration projects.

- Determining if more staff assistance is needed for watershed assessment and planning.

Minor revisions to the MNPSMP were completed between 2008 and 2010. During 2011-2014, major revisions to the document were proposed and the MNPSMP was accepted by EPA in 2015. The update was part of the EPA Strategic Plan priority goal, where “By September 30, 2014, 100 percent of the states will have updated nonpoint source management programs that compare with the new Section 319 grant guidelines that will result in better targeting of resources through prioritization and increased coordination with the United States Department of Agriculture.”

This plan provides updates to the 2015-2019 MNPSMP and describes how the state will improve and protect water quality impacted or threatened by NPS pollution for 2020-2025. The updates to the MNPSMP include revisions to the goals, objectives, performance measures, milestones and strategies for achieving improved water quality. The goals and objectives were updated with input from key partnering stakeholders during two workgroup sessions (summaries are provided in Appendix 2). The revisions to the MNPSMP for 2020-2025 are compatible with and support the strategic plans of the Department and many partnering agencies (see Appendix 3). These partnering agencies include, but are not limited to, the Missouri Department of Health and Senior Services (DHSS), Missouri Department of Conservation (MDC), U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS); Missouri Department of Transportation (MoDOT), U.S. Fish and Wildlife Service (USFWS), EPA and several Department programs.

CHAPTER 2: INTRODUCTION TO NONPOINT SOURCE POLLUTION

“Nonpoint source pollution occurs when rainfall, snowmelt, or irrigation water runs over land or through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into ground water.” (EPA: <https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution>). Nonpoint source pollution enters waterways by overland flow or infiltration (soaking into the soil) as opposed to point source pollution, which is defined as any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. Point source pollution does not include agricultural stormwater discharges or return flows from irrigated agriculture.

By the early 1970s, many of the nation’s rivers, streams and lakes had become severely polluted by sewage and industrial waste discharges. With passage of the Federal Water Pollution Control Act of 1972 (Public Law 92-500)

http://water.epa.gov/lawsregs/rulesregs/upload/cwa_sec401.pdf, Congress set in motion a massive cleanup effort for the nation’s water resources. Throughout the subsequent decades, hundreds of wastewater treatment facilities were constructed or upgraded. Previously polluted streams and lakes became cleaner and aquatic life began to reappear where they had been absent.

However, there is still much work yet to be done as more than half of the nation's impaired waters still do not fully support aquatic life and recreational uses due to NPS pollution.

CHAPTER 3: MISSOURI LANDSCAPES

The Physiography of Missouri

To understand the water quality concerns of the state, it is important to first understand the physiography of Missouri and its relationship to the various soil types and land uses. Much of the information within this section was summarized from the following documents:

Physiographic Regions of Missouri's Physiography, Missouri Water Quality Assessment, Water Resources Report⁵, U.S. Geological Survey (USGS) GAP Analysis for Riverine Ecosystems of Missouri⁶, and the Department's 2018 §305(b) Integrated Water Quality report⁷.

The Mississippi River forms the eastern border of the state, while the Missouri River forms the northwestern border to Kansas City before cutting an east-west path across the state to meet the Mississippi River near St. Louis. These rivers were both originally formed from the melting of the continental ice sheets. The Missouri River roughly forms the southern boundary of the Pleistocene continental ice sheets in the state and rivers and streams to the north often originate in glacial tills or loess.

Missouri is separated along drainage divides that generally correspond with abrupt transitions in geology, landform, soils, land cover and groundwater influences. Therefore, Missouri is often represented in three physiographic provinces: Central Lowlands, Interior Highlands, and Coastal Plains. The Central Lowland province covers the northern and some western parts of the state, where it is further divided into two subdivisions: Dissected Till Plains and the Osage Plains (Figure 1).

DISSECTED TILL PLAINS AND OSAGE PLAINS

The Dissected Till Plains area is the southern limit of the glaciation and is characterized by plains of glacial till (clay, silt, sand and gravel) that are continually becoming more dissected by surface drainage. The unglaciated Osage Plains of west-central Missouri has a gentler topography when compared to northern Missouri and is underlain by Pennsylvanian-age shales, limestone, and sandstones. The Osage Plains area formerly consisted of broad expanses of prairie, while the Dissected Till Plains contained smaller tracts of prairies separated by forests in valleys and on steeper slopes. Today this land is dominated by row crops on the flattest areas with the richest soils, pasture on irregular surfaces, and forests on some of the roughest tracts. Forests of northern Missouri are more abundant today than they were historically⁸.

⁵ <https://dnr.mo.gov/pubs/WR47.pdf>

⁶ <https://esajournals.onlinelibrary.wiley.com/doi/full/10.1890/06-1253.1>

⁷ <https://dnr.mo.gov/document/2018-missouri-integrated-water-quality-report-305b-report>

⁸ Nigh, T. A., & Schroeder, W. A. (2002). Atlas of Missouri Ecoregions. Jefferson City, MO: Missouri Department of Conservation.

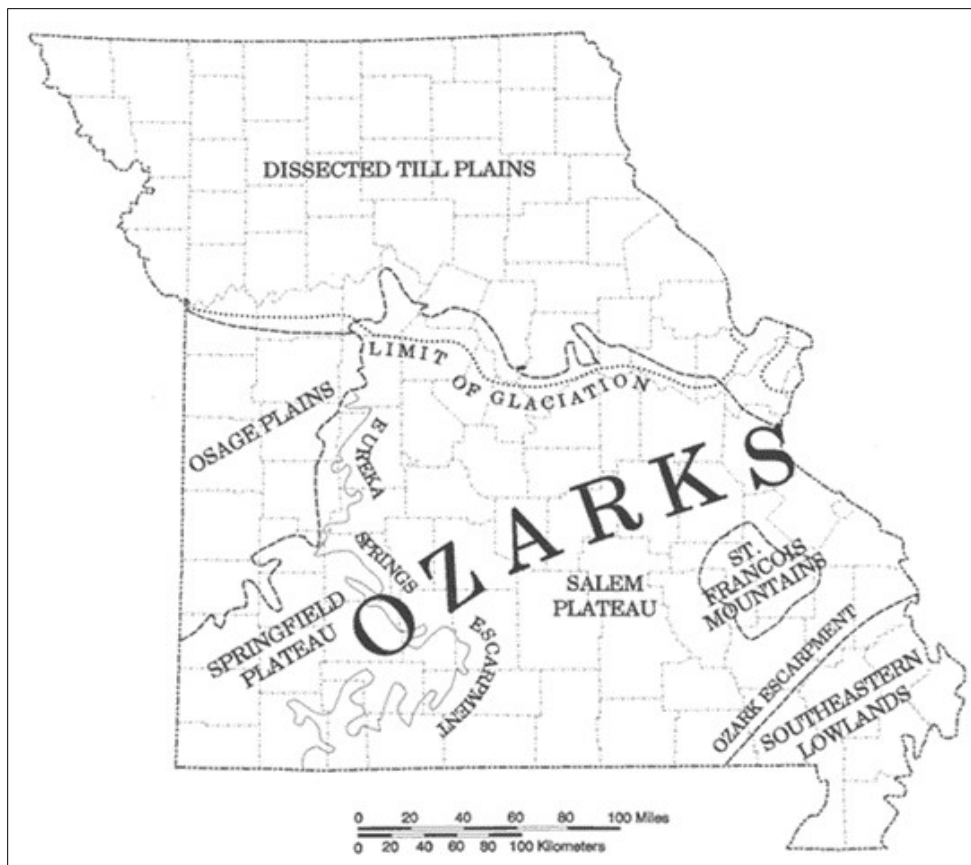


Figure 1. Physiographic regions of Missouri.

The landscapes within the region are mainly flat to gently sloping with an average land slope of 5 percent. Average stream gradients are 10.3 m/km from headwaters, 2.3 m/km for creeks, 0.7 m/km for small rivers, and 0.3 m/km for large rivers. Streams tend to occupy broad valleys and grade gradually into uplands, especially in the southwest and east central portions of the subregion. Many streams have been straightened and channelized and grasslands have typically been converted to croplands. Few large springs exist; therefore, base flows can be low and smaller streams are often intermittent. Low dissolved oxygen concentrations and wide temperature fluctuations are common in streams throughout this region.

Surface waters within this region are generally turbid and affected by high rates of sediment deposition. Soil erosion induced sediment deposition degrades aquatic habitats and stresses aquatic life. Up to 8,000 miles of classified streams may be affected by these processes or other types of aquatic habitat degradation, such as flow modification or channelization that accompany this region's land uses.

Rivers and reservoirs used as drinking water supplies are subject to contamination from herbicides. In the recent past, several reservoirs designated as public drinking water reservoirs have exceeded drinking water standards for the herbicide atrazine or health advisory levels for the herbicide cyanazine. Currently, there is just one reservoir (Lewistown Lake in Lewis County) listed as impaired for atrazine. Local watershed management programs aimed at reducing

herbicide runoff have been relatively effective. Several other herbicides are occasionally found in drinking water reservoirs, but the concentrations have been below health advisory levels.

The quality of groundwater in northern and western Missouri is also influenced by the geology of the area. Public water supply sources include reservoirs and wells. The wells obtain water primarily from glacial drift deposits in portions of north-central and western Missouri. Wells in western Missouri, south of Kansas City, obtain water from limestone aquifers, except for the extreme western limits of Missouri near the state border with Kansas. Private water supplies are obtained from glacial drift deposits and from underlying limestone bedrock in portions of northwestern, central, eastern, and northeastern Missouri. However, deep bedrock wells in many north-central and northwestern Missouri locations tap water supplies that are too mineralized for drinking water purposes. It is believed that some private wells in this part of Missouri may exceed the drinking water standard for nitrate and a very small number may exceed the standard for pesticides. This trend is most frequently caused by localized surface contamination of the wellhead and does not represent widespread contamination of the aquifer. Deeper aquifers are generally protected from surface contamination by impermeable strata.

OZARK PLATEAU

The Interior Highlands province makes up most of southern Missouri and is part of the Ozark Plateau subprovince. The Ozark Plateau is further subdivided in the Springfield Plateau, Salem Plateau, and the St. Francois Mountains. The topography in this region developed from a major uplift centered in the St. Francois Mountains in southeastern Missouri. Precambrian-age rocks form the center of the domal uplift and sequentially, younger rocks surround the center and dip away from it with steeper dips occurring to the northeast, east, and southeast.

The hilly topography of the Ozarks region contains areas with the highest peaks in the state; with average land slopes of 9 percent. Smaller streams within this region tend to be relatively high gradient streams, averaging 17.3 m/km for headwaters and 4 m/km for creeks. Small river gradients average 1.2 m/km and larger rivers average 0.5 m/km.

Pre-settlement vegetation was dominated by forests to the east, woodlands in the central and western Ozarks and prairies along the outer boundary of the subregion. Currently, the eastern Ozarks is dominated by forest cover whereas the western Ozarks have considerably more land in crops and pasture, with woods concentrated on steeper terrain. The bedrock, consisting of limestone, dolomite and sandstone, yields groundwater of excellent quality and of a volume generally adequate to supply urban, industrial and other needs. The soil or subsoil has developed from weathering of bedrock formations and is typically 20 to 80 feet thick. Some areas have extremely thin soils, but in locations where weathering has been extensive, soils may be 100 feet thick or more. The subsoil has moderate to high infiltration rates which contribute to the recharge of groundwater supplies. Streams are typically entrenched into bedrock and influenced to some degree by groundwater flow from large springs⁹. Losing streams, those that lose flow through the streambed to groundwater, occur in karst regions of the Ozarks (Figure 2).

⁹ Nigh, T. A., & Schroeder, W. A. (2002). Atlas of Missouri Ecoregions. Jefferson City, MO: Missouri Department of Conservation.

Ozark streams are generally clear, with base flows well sustained by many seeps and springs. Some streams and reservoirs in the Ozarks are becoming nutrient and algae enriched as a result of increasing human populations and domestic animal production in their watersheds.

Groundwater contamination risks are moderate to high due to the permeability of the soil and bedrock. A variety of surface activities, including agricultural and suburban/urban stormwater and wastewater disposal, mining, stormwater runoff, lawn care, improper well construction or closure and individual onsite wastewater disposal practices, pose threats to surface water and groundwater quality. However, overall water quality remains good because of the ongoing efforts to protect vulnerable aquifers in the Ozarks.

Groundwater is relied upon heavily for a drinking water supply in this part of Missouri. Most municipalities in the southern half of the state exclusively use groundwater for their drinking water. The number of private drinking water wells in the state is not known, but probably ranges between 100,000 and 250,000, with most wells located south of the Missouri River. One major groundwater concern is the potentially rapid and unfiltered transmission of contaminated surface runoff or leachate (e.g., onsite wastewater treatment systems, septic tanks, underground storage tanks, landfills, animal production, and processing waste) through fractures or sinkholes and directly into potable aquifers. Properly cased wells in deep aquifers rarely encounter water quality problems, but shallow or improperly cased wells are at risk.



Photo 1. Devils Icebox at Rockbridge State Park

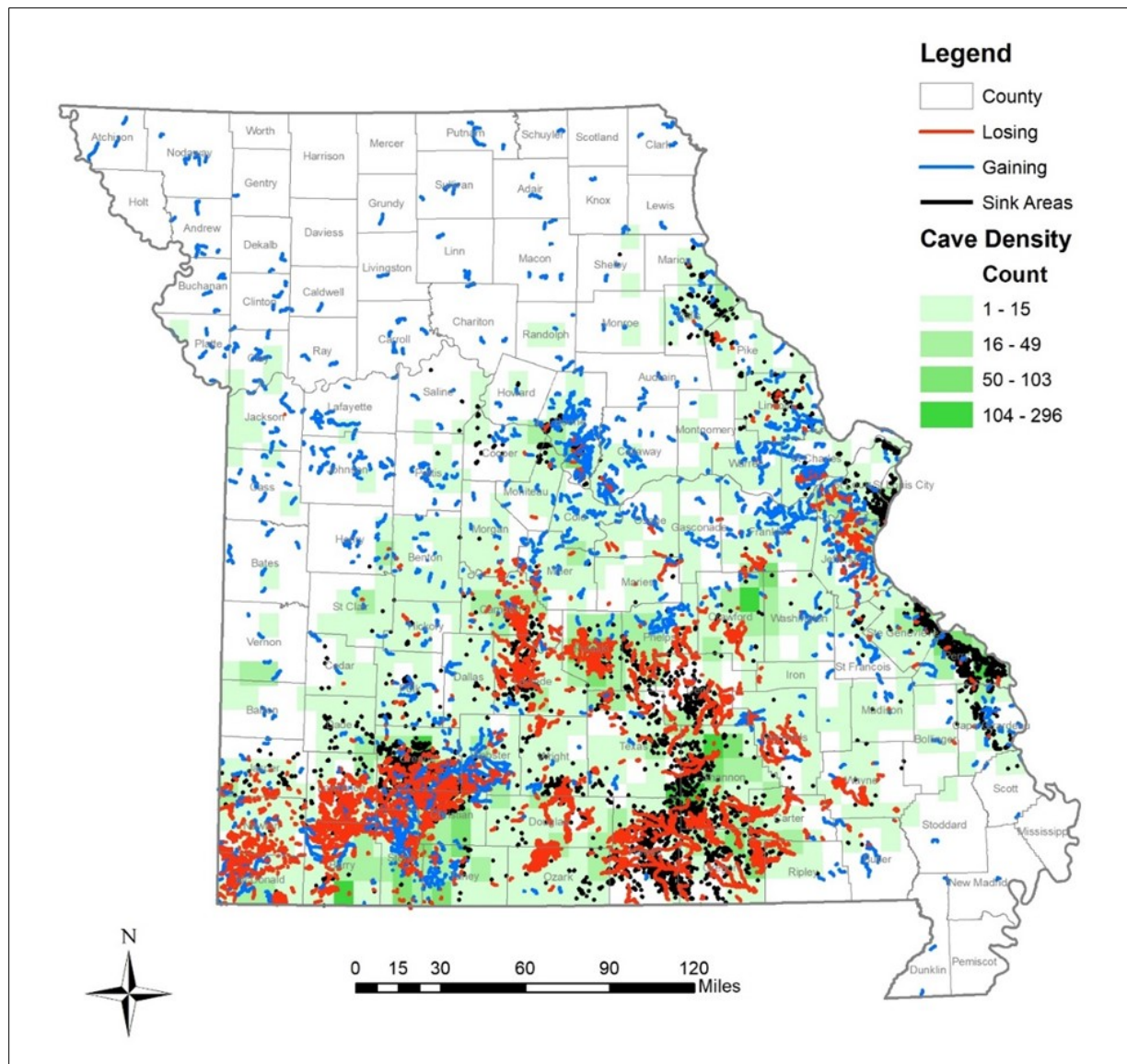


Figure 2. Missouri's karst features.

MISSISSIPPI ALLUVIAL PLAINS

The Southeastern Lowlands (Bootheel Area), is included in the Mississippi Alluvial Plain subprovince of the Coastal Plain province. Quaternary alluvium comprised of sand, gravel, silt, and clay deposited by the Mississippi, Ohio, and St. Francis rivers typically covers the Bootheel Area. The exception in topographic relief to the quaternary alluvium in the Bootheel Area is supplied by Crowley's Ridge, Hickory Ridge and the Benton Hills. These erosional remnants of previous plains rise as much as 250 feet above the adjacent alluvial plain. They are tertiary to Paleozoic in age and parallel the northwestern edge of the province.

The Mississippi Alluvial Basin consists of flat terrain. The region at one time was largely covered by seasonal or perennial wetlands called "swamp forests." Nearly all of the historic land cover in this region has been converted to crop production for soybeans, wheat, corn, cotton, and

rice. Many streams have been channelized and the land is drained by hundreds of man-made ditches. The overall average stream gradient for headwater streams is 2.6 m/km and all other stream classes are less than 1 m/km. The natural hydrography of perennial and seasonal wetlands has been modified here more than anywhere else in Missouri and aquatic habitat degradation is widespread.

The soil types and high infiltration rates on flat fields provides for abundant groundwater. The high groundwater table provides the potential for year-round base flow in the streams and ditches of this region. Springs can be found along the toe slope of Crowley's Ridge. Public water supplies that tap deeper aquifers provide good quality water, but shallow private wells may, at times, contain nitrates and low levels of pesticides. The exceedance frequency of drinking water standards for nitrates and pesticides in private wells is believed to be similar to private wells in northern Missouri.

GREAT RIVERS

The Great Rivers (Missouri River, Mississippi River) are not classified as a subregion of their own, but are unique aquatic ecosystems and represent a significant water resource of Missouri. Approximately 1,053 miles of Great River habitat fall under Missouri's jurisdiction. The Great Rivers support a wide array of industrial and commercial needs, numerous recreational opportunities and are utilized as primary sources of drinking water for many communities. Fish fauna of the Great Rivers are comprised of a distinct assemblage of species, some of which occur nowhere else in Missouri¹⁰.

In northern Missouri, where surface and deep aquifer supplies are unreliable, many towns depend on the alluvial aquifer of nearby rivers. Landfills and industrial land use in Kansas City and St. Louis have historically been located on river floodplains and have caused local contamination of the Missouri and Mississippi rivers, respectively. While alluvial aquifers of the Great Rivers may yield large quantities of groundwater, pumping induces recharge from the rivers which is a potential source of contamination. Some municipal water supplies have been impacted by groundwater contamination in the past, and thus, groundwater from these aquifers requires treatment.

Land Covers and Land Use

Missouri is a diverse state and consists of large rural areas, major agriculture and mining industries and two complex metropolitan areas (Kansas City and St. Louis). Of Missouri's 44.6 million acres of land, approximately 94.5 percent is in cultivated crops (21.4 percent), hay/pasture (29.6 percent), forest (36.6 percent), or has been developed or urbanized (6.9 percent) (Figure 3).

CULTIVATED CROPS AND HAY/PASTURE LANDS

Based on the three major physiographic regions and the diverse topography throughout the state, soil types differ significantly and generally dictate the use of the agricultural land and the

¹⁰ Pflieger, W. L. 1997. The Fishes of Missouri. Missouri Department of Conservation, Jefferson City

cropping practices. Table 1 provides an overview of the major soil types found within the physiographic regions of the state.

Missouri is second in the nation in the number of farms¹¹. Corn and soybeans are the principle crops grown throughout the state, but these crops are primarily concentrated in the Dissected Till and Osage Plains regions of Missouri. Wheat intercropped with corn, soybeans, rice, and cotton are grown in the Mississippi Lowlands or Bootheel Region. Missouri also has a large, diverse livestock industry and large amounts of pastureland are present in all regions of the state. More than half of Missouri's agriculture receipts come from corn, soybeans, cattle, hogs, and turkeys with livestock accounting for over half of the agricultural receipts. Missouri generally ranks in the top ten nationally in rice, cotton and grain sorghum receipts. Common water quality impacts are generally due to a lack of conservation practices and stream channelization.

Table 1. Overview of Missouri soil types.

Soil Type	Description
Restrictive clay pan soils	Located throughout Missouri
Glacial till soils	Can have a clay pan and are historically associated with humid, prairie regions in northern Missouri
Fragipan soils: <ul style="list-style-type: none"> • Loess over shale • Loess over limestone soils or heavy red clay pans 	<ul style="list-style-type: none"> ○ Located in western Missouri in the Osage Plains which were historically covered by mixed prairie and deciduous forests. ○ Located in the deeply weathered, karst soils in the Ozark Plateau which were historically deciduous forests.
Alluvial deposits	Located in the Southeastern Lowlands and formed from Mississippi River flooding. These soils include layers of sand, silt, clay and gravel with very shallow permanent water table which were historically cypress and tupelo swamps.

¹¹ <https://agriculture.mo.gov/abd/intmkt/pdf/missouriag.pdf>

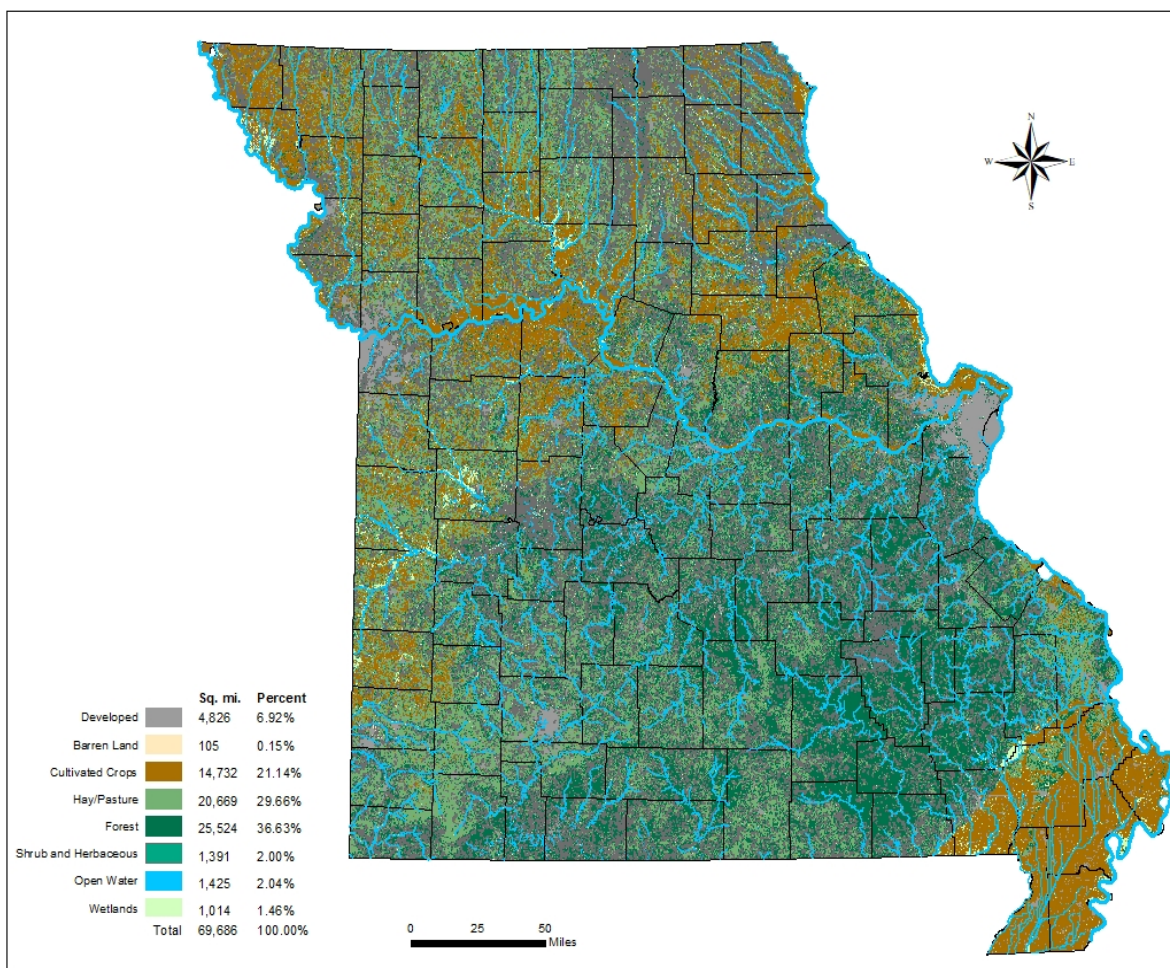


Figure 3. Missouri's major land covers.

FORESTED LANDS

Lumber industry in Missouri has always been prominent and hardwoods are harvested statewide, but largely from the Ozark Plateau region¹². In the late 1800s and early 1900s, Missouri's rich short leaf pine forests attracted lumber men from the eastern United States, making Missouri one of the leading lumber-producing states in the nation. By 1920, when there were no more trees left to cut in the Ozarks, the timber boom ended. Since this time, much forest conservation work has been done to regenerate and sustain Missouri's forests¹³. Today, annual growth of forests exceeds the amount harvested, ensuring ample forests for future generations.

In 2010, Missouri was ranked seventh in the nation in terms of forest acreage¹⁴. Of the Missouri lands that are forested, 83 percent are privately owned, 12 percent are federally owned, and 5 percent are in state and local ownership¹⁵. The USDA Mark Twain National Forest is the largest

¹² <https://dnr.mo.gov/env/wpp/mnrsc/docs/01-28-14-intro.pdf>

¹³ <https://mdc.mo.gov/trees-plants/forest-care/forest-facts>

¹⁴ <https://sciencing.com/ecosystems-missouri-7586153.html>

¹⁵ <https://www.stateforesters.org/wp-content/uploads/2018/07/Missouri-Forest-Action-Plan-Five-Year-Review.pdf>

individual public land in Missouri with approximately 1.5 million acres. The Mark Twain National Forest extends across 29 counties from the St. Francois Mountains in southeast Missouri to the plateaus of the Ozarks in the southwest¹⁶. Improper forestry activities can impact nearby water bodies through soil erosion and nutrient runoff from disturbed areas, improperly constructed access roads and stream crossings, oil and grease from machinery and equipment, and leaching of tannic acids from woody debris and sawdust piles.

DEVELOPED AND URBAN LANDS

Slightly less than seven percent of Missouri's land covers are classified as developed or urbanized. Of the 960 cities and towns, over one-third of Missouri's six million residents¹⁷ reside in the highly urbanized metropolitan areas of Kansas City and St. Louis (Table 2). Both of these cities are located adjacent to the Great Rivers of Missouri.

Table 2. Missouri's top 20 cities by population rank.¹⁸

Rank	City	Population	Rank	City	Population
1	Kansas City	491,918	11	Blue Springs	55,104
2	St. Louis	302,838	12	Florissant	51,272
3	Springfield	168,122	13	Joplin	50,657
4	Columbia	123,180	14	Chesterfield	47,644
5	Independence	116,925	15	Jefferson City	42,838
6	Lee's Summit	98,461	16	Wentzville	41,164
7	O'Fallon	88,472	17	Cape Girardeau	39,853
8	St. Joseph	75,959	18	Oakville	37,007
9	St. Charles	70,764	19	Wildwood	35,517
10	St. Peters	57,127	20	University City	34,322

According to the Missouri Economic Research and Information Center,¹⁹ the counties with largest population changes are projected to be in St. Charles (near St. Louis), Clay (near Kansas City), and Greene counties (in Springfield) with more than a 75,000 gain between 2000 to 2030; while Lincoln (near St. Louis) and Christian (near Table Rock Lake) counties are predicted to be the fastest growing over the same time frame. If not properly planned, urbanization can cause great impacts to the health of the local waterways. The most common impacts to water quality include increased flow due to more impervious surfaces (roadways, rooftops, parking lots, compacted soils, etc.) causing stream bank and bed erosion and increasing sediment loads; nutrient inputs from lawn fertilizers, leaking sewer pipes, lawn and tree debris; elevated bacteria levels due to pet waste, combined sewer overflows, leaking sewer pipes or onsite wastewater treatment systems; and sediments from land disturbance activities. Section 319 NPS grant funds

¹⁶ https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm8_045324.pdf

¹⁷ <https://www.census.gov/quickfacts/fact/table/MO/PST045218>

¹⁸ https://www.missouri-demographics.com/cities_by_population

¹⁹ <https://www.missourieconomy.org/data/population/new-population-projections>

are available in Municipal Separate Storm Sewer Systems (MS4) communities as long as the activities are above and beyond what is required in a MS4 permit (Appendix 4).

MINE LANDS

Due to its unique geography, Missouri has a long and diversified mining history with the primary commodities being metals (lead, zinc, iron, copper, cobalt, nickel, silver and barium-barite) and coal. Other mining activities include clay and gravel.

Metals Mining

Missouri is made up of three major lead mining districts:

- Southeast Missouri Lead District - Southeast Missouri has one of largest known galena (lead sulfite) deposits in the world. This area has produced lead almost continuously since 1721. As technology improved, mining operations changed from surface and shallow (up to 300 feet deep) underground mining in the old lead belt region in St. Francois, Washington and Ste. Genevieve counties to deep (average depth 1,200 feet) underground mining in the newer lead belt region also known as the Viburnum Trend. The Viburnum Trend stretches through Washington, Crawford, Iron, Dent, Reynolds and Shannon counties. The Viburnum Trend still produces lead, zinc, copper, silver, cobalt and nickel found within the ore deposits²⁰. Several historical and inactive mining sites within the old lead belt region were left with tailings and chat piles containing elevated levels of lead and zinc that pose a threat to human health and the environment. Through settlement agreements, EPA has and continues to clean up several sites within the old lead belt district²¹, but additional work to control NPS runoff will continue long into the future.
- Tri-State District - Mining operations in the Tri-State District included approximately 14 counties in southwest Missouri, Cherokee County, Kansas and Ottawa County, Oklahoma. Mining in this area began during the mid-1800s. Lead and zinc were the primary commodities, producing 23 million dollars in lead and zinc. Historical mining activities left much of the area contaminated with lead, cadmium, and zinc, which are impacting residential homes and drinking water source. Through settlement agreements, EPA has and will continue to clean up several sites within Tri-State District, however, other efforts to address NPS water quality impairments will continue under other funding mechanisms.
- Central District – The Central District centers around the Lake of Ozarks area and includes Morgan, Miller, Camden, Moniteau, Cooper and Cole counties. This district produced the least amount of ore when compared to the Southwest and Tri-State Districts.

²⁰ <https://pubs.usgs.gov/sir/2008/5140/pdf/Chapter1.pdf>

²¹ <https://www.epa.gov/enforcement/case-summary-epa-funded-sites-and-communities-asarco-bankruptcy-settlement#oronogo>

Coal Mining

Since the early 1840s, coal mining has been a major industry in the north-central and southwest portions of Missouri. Up to six million tons of coal was mined annually in the first three decades of the 20th century. Prior to the passage of Missouri's first strip-mine legislation in 1971, post mining reclamation requirements were not in place, leaving some 67,000 acres of land abandoned. The Department's Land Reclamation Program (LRP) and partners, have identified nearly 11,000 acres that require at least some amount of reclamation work to correct a wide range of public health, safety and environmental problems. Safety hazards include steep and unstable highwalls and embankments, open mine shafts, abandoned equipment and facilities, dangerous impoundments and unsanitary trash. The environmental impacts on nearby water bodies include acid mine drainage, sedimentation from exposed coal waste, and mine spoils²². Additional information about Missouri's abandoned coal mines can be found on the Department's LRP website: <https://dnr.mo.gov/land-geology/hazards/abandoned-mine-lands>.

PUBLIC LANDS

Approximately 93 percent of Missouri's 44.6 million acres is privately owned²³. Of the seven percent of public lands, approximately 98 percent is held by MDC and the Department, while the remaining two percent is federally maintained by the U.S. National Park Service (USNPS), USFWS and the U.S. Forest Service (USFS) (Figure 4). Many of these areas are also located within the watersheds of Missouri Outstanding State or National Waters (Figure 6).



Photo 2. Swimming at Stockton Lake

²² <https://dnr.mo.gov/land-geology/hazards/abandoned-mine-lands>

²³ <https://mdc.mo.gov/magazines/conservationist/2002-03/conservation-lands>

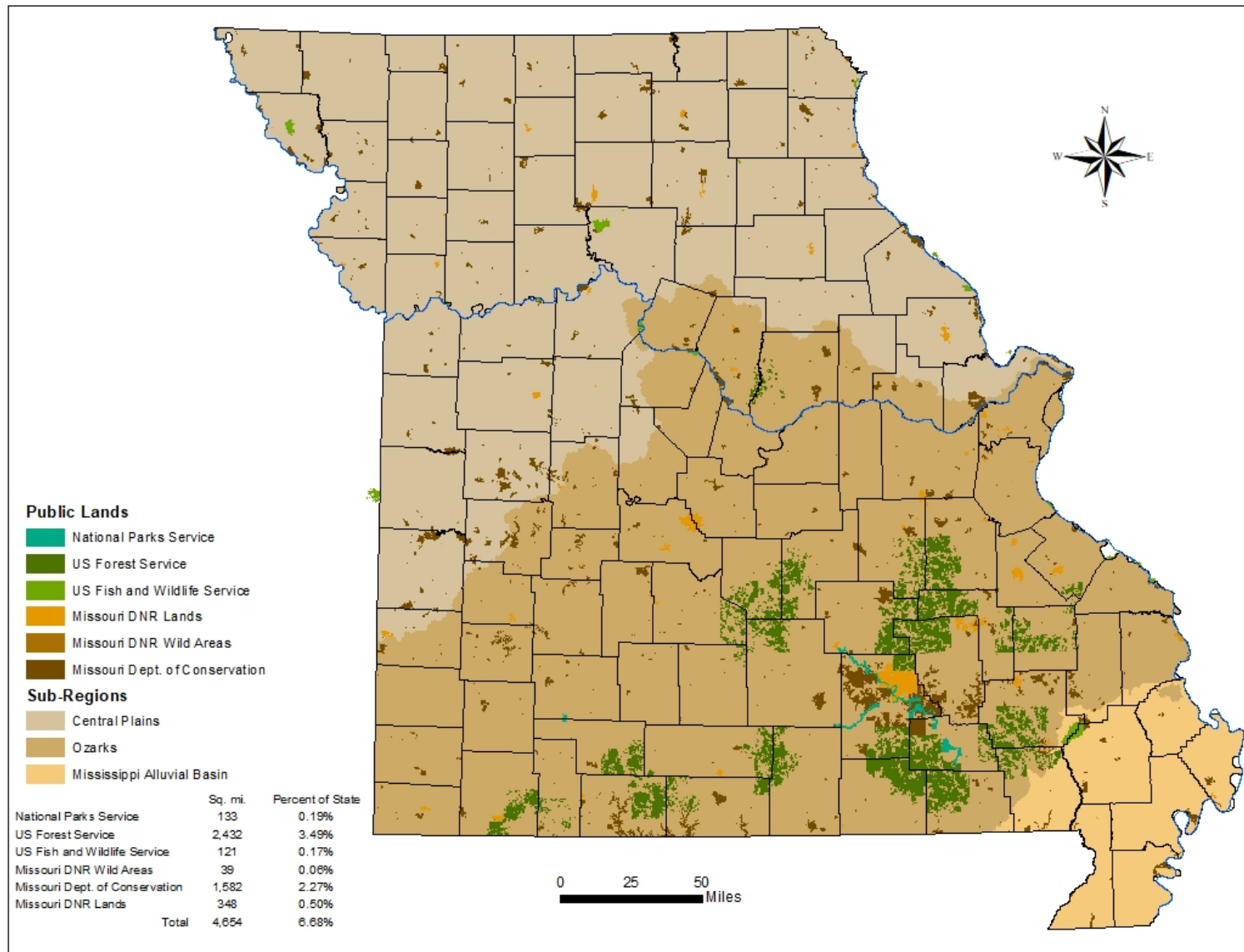


Figure 4. Missouri's public lands.

Chapter 4: Missouri's Water Resources

Missouri's water resources are diverse, and present many challenges for the Missouri §319 NPS Program. In addition to the two Great Rivers (Mississippi River, Missouri River), Missouri's landscape contains a large number of smaller rivers, streams and lakes. These waters are expected to meet the needs of municipal, industrial, and agricultural operations while simultaneously serving as sources of safe drinking water, recreational sites, and wildlife habitats.

Classified streams in Missouri total 115,772 miles, and classified lakes cover an area of 363,653 acres (Table 3). Classified streams and lakes include those waters listed in Tables G and H of Missouri's WQS at 10 CSR 20-7.031. Unclassified streams contribute another 142,666 miles to Missouri's stream network, while unclassified lakes provide an additional 68,302 acres of surface area. Unclassified streams and lakes refer to waters not listed in Tables G and H of Missouri's WQS, but that are still considered waters of the state. Unclassified waters are afforded protection under Missouri's WQS, albeit to a lesser extent than classified waters. In order to be considered a classified wetland under Missouri's WQS 10 CSR 20-7.031(1)(F), wetlands must meet criteria established in the *United States Army Corps of Engineers Wetlands Delineation Manual 1987*; however, a defined set of classified wetlands does not exist at this time. Previous work by the Department's Division of Geology and Land Survey estimated wetland coverage in the state to be approximately 624,000 acres²⁴.

Table 3. Overview of surface waters in Missouri

Topic	Value	Scale	Source
State Population (number)	6,093,000	N.A.	US Census Bureau, 2016 estimate
State Surface Area (sq. miles)	68,742	N.A.	US Census Bureau
River Sub-Basins (8-digit HUCs)	66	1:24,000	USGS NHD and USDA NRCS WBD
Classified Stream (miles)	115,772	1:24,000	WPP MUDD
Perennial (miles)	13,309	1:24,000	WPP MUDD
Intermittent (miles)	102,463	1:24,000	WPP MUDD
Losing streams (miles)	37,027	1:24,000	MGS
Great Rivers (miles)	1,053	1:24,000	WPP MUDD
Springs (number mapped)	4,487	1:100,000	MGS
Classified Lakes (acres)	363,653	1:24,000	WPP MUDD
Unclassified Streams (miles)	142,666	1:24,000	USGS NHD
Unclassified Lakes (acres)	68,302	1:24,000	USGS NHD
Freshwater Wetlands (acres)	624,000	1:24,000	MGS

USGS NHD - United States Geological Survey, National Hydrography Data Set; USDA NRCS WBD - United States Department of Agriculture, National Resources Conservation Service, Watershed Boundary Dataset; WPP MUDD - Water Protection Program, Missouri Use Designation Dataset; MGS - Missouri Geological Survey.

²⁴ <https://dnr.mo.gov/pubs/WR39.pdf>

Water Quality Standards

Missouri's rivers, streams and lakes are assigned designated uses listed in Table 4 and described in Tables G and H of Missouri's WQS at 10 CSR 20-7.031²⁵. As required under the CWA, WQS are adopted by the state to protect the designated uses of a water body, such as recreation (boating, swimming), fishing, irrigation, drinking water, etc. As previously described, unclassified streams and lakes refer to waters without designated uses, but that are considered waters of the state and where general, narrative criteria apply.

The Missouri's WQS were first promulgated for Missouri's waters in 1970 and are required to be revised at least every three years. Missouri's WQS now list 115,772 miles of streams and 363,653 acres of lakes with designated uses. Table 4 summarizes the various designated uses assigned to Missouri waters. The numbers of stream miles and lake acres listed in Table 4 are current as of October 22, 2014.

Table 4. Designated uses assigned to Missouri waters

Designated Uses	Stream Miles	% of Total	Lake Acres	% of Total
Drinking Water Supply	3,551	3.07%	122,363	34%
Industrial Water Supply	1,638	1.41%	6,519	2%
Irrigation	115,772	100.00%	363,653	100%
Livestock and Wildlife Protection	115,772	100.00%	363,653	100%
Whole Body Contact Category A	6,269	5.41%	302,613	83%
Whole Body Contact Category B	108,875	94.03%	60,975	17%
Secondary Contact Recreation	115,772	100.00%	363,653	100%
Outstanding State Resource Waters	217	0.18%	467	0.13%
Outstanding National Resource Waters	202	0.17%	0	0%
Human Health Protection	115,772	100.00%	363,653	100%
Warm Water Habitat	115,772	100.00%	363,653	100%
Cold Water Habitat	301	0.26%	47,183	13%

Assessment of Missouri's Water Quality²⁶

The Missouri §305(b) Integrated Water Quality report [hereafter the §305(b) report] is prepared every two years by the Department to meet requirements of §303(d), §305(b) and §314 of the federal CWA. Section 303(d) requires states to submit a list of waters not meeting WQS. Section 305(b) requires an assessment of surface water quality and a summary of monitoring and pollution control activities. The primary purpose of the §305(b) report is to provide the EPA and residents of Missouri with an update on the condition of surface water and groundwater quality in the state. Data used in the report were generated through the Department's monitoring activities and the work of other agencies and organizations operating in conjunction with or

²⁵ <https://www.sos.mo.gov/adrules/csr/current/10csr/10c20-7a.pdf>

²⁶ The information provided in this section was summarized from the 2018 Missouri Integrated Water Quality Report available at: <https://dnr.mo.gov/document/2018-missouri-integrated-water-quality-report-305b-report>

independently of the Department. The data were assessed using procedures contained in the Department's §303(d) Listing Methodology Document (LMD)²⁷. In addition, §314 of the CWA requires status and trend assessments of publicly owned lakes. This information is also included in the §305(b) report.

SECTION 303(D) ASSESSMENT PROCESS

Water quality criteria are used to protect specific designated uses (Table 4) assigned to individual waters. Protective criteria include a range of physical, chemical and biological parameters. Thus, in order to determine if a designated use is being attained, specific types of data must be collected to compare to the protective criteria. Assessing most designated uses involves analyzing multiple parameters, but in some cases, exceeding a single criterion is enough evidence to assess a water body's designated use as impaired. As previously discussed, all classified waters of the state, including large public lakes, are protected for whole body and/or secondary contact recreation, protection of aquatic life, fish consumption by humans, and livestock and wildlife watering. In addition, some waters are protected for drinking water supply, irrigation and industrial process, and use as cooling water for industrial processes.

A brief description of how the Department assesses each of these designated uses is summarized below. Each applicable designated use assigned to a classified water body will be placed into one of following four categories:

- 1) designated use is fully attained;
- 2) designated use is not attained;
- 3) designated use not assessed due to insufficient data; or
- 4) designated use not assessed.

Generally, a water body use assessment of "fully attained" suggests water quality is fair to excellent, whereas an assessment of "not attained" indicates poor water quality. Waters with at least one designated use assessed as "not attained" are considered impaired. When possible, potential or known causes and sources of the impairment are described.

Once all attainment decisions have been made for a water body, they are then categorized according to the degree of compliance with WQS. The Department utilizes a five-category system for reporting attainment of applicable WQS and in developing monitoring strategies that respond to the resource issues identified in the assessment.

²⁷ <https://dnr.mo.gov/document/methodology-development-2020-section-303d-list-missouri>

The five-category process is summarized below.

- **Category 1:** All designated uses are fully attained.
- **Category 2:** Available data indicate that some, but not all of the designated uses are fully attained.
 - **Subcategory 2A:** Available data suggest compliance with Missouri's WQS. No impairment is suspected.
 - **Subcategory 2B:** Some available data suggest noncompliance with Missouri's WQS. Impairment is suspected.
- **Category 3:** There are insufficient data and/or information to assess a designated use.
 - **Subcategory 3A:** Available data suggest compliance with Missouri's WQS. No impairment suspected.
 - **Subcategory 3B:** Available data suggest noncompliance with Missouri's WQS. Impairment is suspected.
- **Category 4:** Available data indicate that at least one designated use is in noncompliance, but a Total Maximum Daily Load (TMDL) ²⁸ study is not required.
 - **Subcategory 4A:** A portion of the water is in noncompliance with state WQS due to one or more discrete pollutants and EPA has approved a TMDL.
 - **Subcategory 4B:** A portion of the water is in noncompliance with state WQS due to one or more discrete pollutants and pollution control requirements (i.e., water quality-based permits and/or voluntary watershed-control plans) have been issued that are expected to adequately address the pollutant(s) causing the impairment.
 - **Subcategory 4C:** A portion of the water is in noncompliance with state WQS and a discrete pollutant(s) or other property of the water is not identified as causing the impairment.
- **Category 5:** At least one discrete pollutant has caused noncompliance with Missouri's WQS and the water body does not meet the qualifications for listing as a Category 4A, 4B, or 4C water body. Only Category 5 waters are placed on the state's §303(d) List.

2018 305(B) INTEGRATED WATER QUALITY REPORT SUMMARY

In the 2018 §303(d) List of Impaired Waters approved by the EPA

(<https://dnr.mo.gov/document/epa-approval-letter-missouris-2018-303d-list>), data were available to assess approximately 115,772 miles of classified streams and 363,653 acres of classified lakes. Of those streams assessed (11,416 miles), data indicated 5,740 miles (50 percent) fully supported designated uses; while 5,676 miles (50 percent) were found to be impaired for at least one designated use. Major causes for impaired uses included bacteria, low dissolved oxygen, mercury in fish tissue, heavy metals, and limited aquatic macroinvertebrate communities. Major

²⁸ A total maximum daily load is a plan for restoring impaired waters that identifies the maximum amount of a pollutant that a body of water can receive while still meeting WQS.

sources of impairment included urban and agricultural NPS pollution, mining activities, and atmospheric deposition.

Of the classified lakes that were assessed (257,274), 185,272 acres (73 percent) fully supported their designated uses; while 72,002 acres (28 percent) are impaired for one or more designated uses. Primary causes of impaired uses in lakes included nutrients, chlorophyll-a and mercury in fish tissue. Major pollutant sources include urban and agricultural NPS pollution, and atmospheric deposition.

Lake trophic status was summarized for 227 lakes (269,193 acres). Approximately 42,415 acres (15.8%) of lakes are classified as oligotrophic; 41,461 acres (15.5%) are mesotrophic; 180,770 acres (67.4%) are eutrophic; and 3,408 acres (1.3%) are hypereutrophic. Trophic status varies considerably between the physiographic regions of the state. Oligotrophic lakes are mostly found in the Ozarks where the predominately forested landscape contributes few nutrients through NPSs. Within the Glaciated and Osage Plains regions where agriculture is a widespread land use, the majority of lakes are in the eutrophic category.

Of the waters assessed, 68 water body-pollutant pairs listed in the 2016 §303(d) are proposed to be removed from the 2018 §303(d) list. Water body-pollutant pairs may be removed from the §303(d) list due to attainment of WQS, establishment of a TMDL for the water body, or if the original impairment listing was in error. Water body-pollutant pairs determined to be attaining WQS due wholly or in part to NPS reduction efforts are candidates for state §319 NPS “success stories” under EPAs 2020-2021 National Water Quality Measures.

NONPOINT SOURCE IMPAIRED WATERS

A challenge in addressing NPS pollution in Missouri is due to the wide variety of sources. Table 5 shows the most common nonpoint sources of impairments in Missouri’s classified water bodies.

Table 5. Major nonpoint source impairments in Missouri’s classified waters.

Sources	Stream Miles Impaired	Percent of Total Miles	Lake Acres Impaired	Percent of Total Acres
Nonpoint Sources (Unspecified)	2,169	9%	44,257	15%
Unknown Sources	1,091	5%	580	0.2%
Atmospheric Deposition	664	3%	25,260	8%
Mining	276	1%	--	--
Tailings	255	1%	--	--
Other Mining Activities	21	*	--	--
Agriculture	151	0.6%	133	<1%
Hydromodification	115	0.5%	246	0.1%
Channelization Flow	66	0.3%	--	--
Regulation/Modification	29	0.1%	--	--
Upstream Impoundment	20	0.1%	246	0.1%
Habitat Modification	41	0.2%	--	--
Urban Runoff and Construction	244	1%	185	0.1%
Natural Sources	2	<1%	--	--
Recreational Activities	8	<1%	--	--

NONPOINT SOURCE THREATENED WATERS

While NPS impaired waters are the primary focus for Missouri's NPS pollution reduction efforts, there are other waters in the state that merit attention and may be eligible for §319 NPS or other grant funding opportunities. NPS threatened waters are those waters where NPS pollution may cause or contribute to exceedances of WQS or antidegradation requirements in high quality or potentially impaired waters. Where waters are already impaired by NPS pollution, state efforts will be focused to restore the water body to attainment of its designated uses. Protection of NPS threatened waters in the near term, and the economic, recreational, scientific and cultural values they possess, is often times more cost effective than restoration efforts in the long term. The priority for NPS threatened waters will be determined on a case-by-case basis and these waters will be incorporated into NPS pollution reduction efforts.

POTENTIALLY IMPAIRED WATERS

Watershed protection efforts for rivers, streams and lakes that are determined by the state to be potentially impaired or trending toward impairment due to NPS pollution are an eligible use of §319 grant funds for development and implementation of EPA-accepted 9-element watershed-based plans (WBPs) or alternative plans. A list of potentially impaired waters designated by the state can be found in the most recent §305(b) report²⁹ and are also included in Appendix 5 and 6 of this document. Appendix 5 lists waters rated as impaired (category 5 waters) or believed to be impaired and waters with approved TMDLs, waters where sufficient pollution control measures are in place, waters which are impaired by measures other than discrete pollutants, and other waters which were not approved for §303(d) listing by the Clean Water Commission (category 4 waters). Appendix 6 provides a list of potentially impaired waters (category 3 waters) for which there is some indication an impairment to a designated use may exist, but current data or information indicating an impairment does not meet the data requirements in Missouri's §303(d) LMD. As resources allow, the Department will conduct further water quality and/or biological monitoring on these waters to determine whether these impairments actually exist.

EMERGING NONPOINT SOURCE POLLUTANTS

The widespread use of chemicals that may have adverse effects on the endocrine systems of aquatic life is an emerging issue of nationwide concern. Laboratory and stream studies have demonstrated strong evidence that exposure to some of these chemicals is associated with adverse developmental and reproductive effects on fish and other aquatic life. Primary chemicals of concern include hormones, antibiotics, pharmaceuticals, herbicides and pesticides that can be associated with NPS runoff into rivers, streams, lakes, and groundwater. See EPA's website for additional information: <https://www.epa.gov/wqc/contaminants-emerging-concern-including-pharmaceuticals-and-personal-care-products> and <https://www.epa.gov/fedfac/emerging-contaminants-and-federal-facility-contaminants-concern>.

The toxins produced by some species of blue-green algae are another growing concern. Several incidents of pet or livestock deaths and human illness in the United States have been linked to blue-green algal blooms. These blooms usually occur in mid- to late-summer and can produce toxins. Death of pets or livestock usually occurs from directly drinking contaminated water or

²⁹ <https://dnr.mo.gov/document/2018-missouri-integrated-water-quality-report-305b-report>

accumulating a heavy coat of toxic algae on their hair while wading or swimming, and later ingesting the algae while cleaning themselves. Humans can be affected by accidental ingestion of water or direct contact with the skin and other sensitive organs. The Department, MDC and DHSS have recently convened a harmful algal bloom (HAB) task force to document, investigate and determine the magnitude and extent that HABs exist in Missouri lakes and reservoirs. This task force will provide a coordinated means of monitoring, tracking and reporting HABs and associated toxins to ensure impacts to designated beneficial uses are minimized.

The Department supports research on emerging NPS pollutants. Section 319 grant funds may be used for studies that investigate the extent and severity of emerging pollutants or document the effectiveness of various conservation practices, including those that reduce HABs. See the Department's website for additional information: <https://dnr.mo.gov/water/how-water/pollutants-sources/cyanobacteria-harmful-algal-blooms-blue-green-algae>.

CHAPTER 5: MISSOURI WATERSHED PLANNING

The statewide watershed planning efforts are conducted at the HUC-8 watershed scale and used by the Department to protect our state's water resources. These watershed planning efforts provide direction and focus for watershed planning and implementation and is the top priority of the MNPSMP. Watershed planning efforts recognize the nexus between local citizen engagement and the development and implementation of successful WBPs and policies, and provide opportunities for local citizens and leaders for input and to influence decisions regarding water resource priorities and goals at the local level. These opportunities for local citizen engagement occur throughout the watershed planning process.

A watershed planning process includes cooperation with a variety of interested parties such as local governments (cities, municipalities, and counties), private citizens, watershed groups and private businesses within individual HUC-12 or -8 watersheds. Through a process of meetings, local participants are given the opportunity to share information and reach common understandings about the water resources in their watershed. They are able to provide input for setting watershed priorities and documenting next steps and actions for addressing those priorities. Some intangible products of this type of watershed planning includes a shared understanding of each watershed by its citizens, and a shared, proactive call for action for the protection of the local water resources. The tangible product of a watershed planning effort is the development of a 9-element WBP (Appendix 8) or other acceptable alternative plan that details local citizens' discussions and recommendations for actions in their watersheds. The plan represents the foundational step for in-depth conservation planning and recommended actions for addressing water quality impairment(s) and other water quality concerns or threats, and provides a funding mechanism to implement voluntary conservation and management practices stated in the WBP.

During implementation of the MNPSMP (2020–2025), a portion of the §319 grant funds will be used for the development and implementation of EPA-accepted 9-element WBPs. The WBPs will identify realistic pollution load reduction goals based on the conservation and management practices that local producers and municipalities have indicated they are willing to voluntarily

implement. Specific areas where management practices need to be implemented are determined through the watershed planning process.

Watershed Prioritization

Missouri's goal for the 2020-2025 MNPSMP is to develop and implement WBPs within priority HUC-8 watersheds of the state. This is a lengthy process and is necessary to prioritize watersheds for planning and implementation. Figure 5 provides an overview of the prioritization framework for Missouri. Group One HUC-8 watersheds will be the primary focus for watershed planning and implementation for the 2020-2025 MNPSMP. High priority and sensitive watersheds (e.g. National and State Outstanding Waters, waters with economic or ecological significance) will also be eligible for the development and implementation of protection plans. Other areas of the state may be eligible for planning and implementation if an active organization is present and willing to develop and implement WBPs. Further prioritization at the subwatershed level (HUC-12) may occur to allow additional focus on specific water bodies, pollutants (e.g. E. coli, sediment, nutrients) or sources of NPS impairments (e.g. urban or rural areas).

The original ranking of Missouri's 66 HUC-8 watersheds that resulted in the Spring, Big and Lower Grand river watersheds being chosen as pilot watersheds in 2012 was performed by a team of technical experts from throughout the Department. These staff built a system to produce a ranking and additional weighted ranking to determine true priority amongst the 66 HUC-8 watersheds. There were four main categories that were ranked using available data and information about the watershed. The categories are:

- **Preservation:** This category ranked watersheds in terms of their healthy components. In other words, a watershed that ranked high in preservation would have outstanding resource qualities that are worthy of preservation.
- **Restoration:** Somewhat the opposite of preservation, this category provides a ranking based on knowing there are areas of the watershed that are impaired and therefore score higher.
- **Nutrient:** A fairly straightforward category, that makes a ranking determination based on known nutrient impacts for each watershed.
- **Source Water Protection:** Missouri's Watershed Planning process includes setting priorities for water quantity; therefore, watersheds were also ranked based on the need to protect source water supplies.

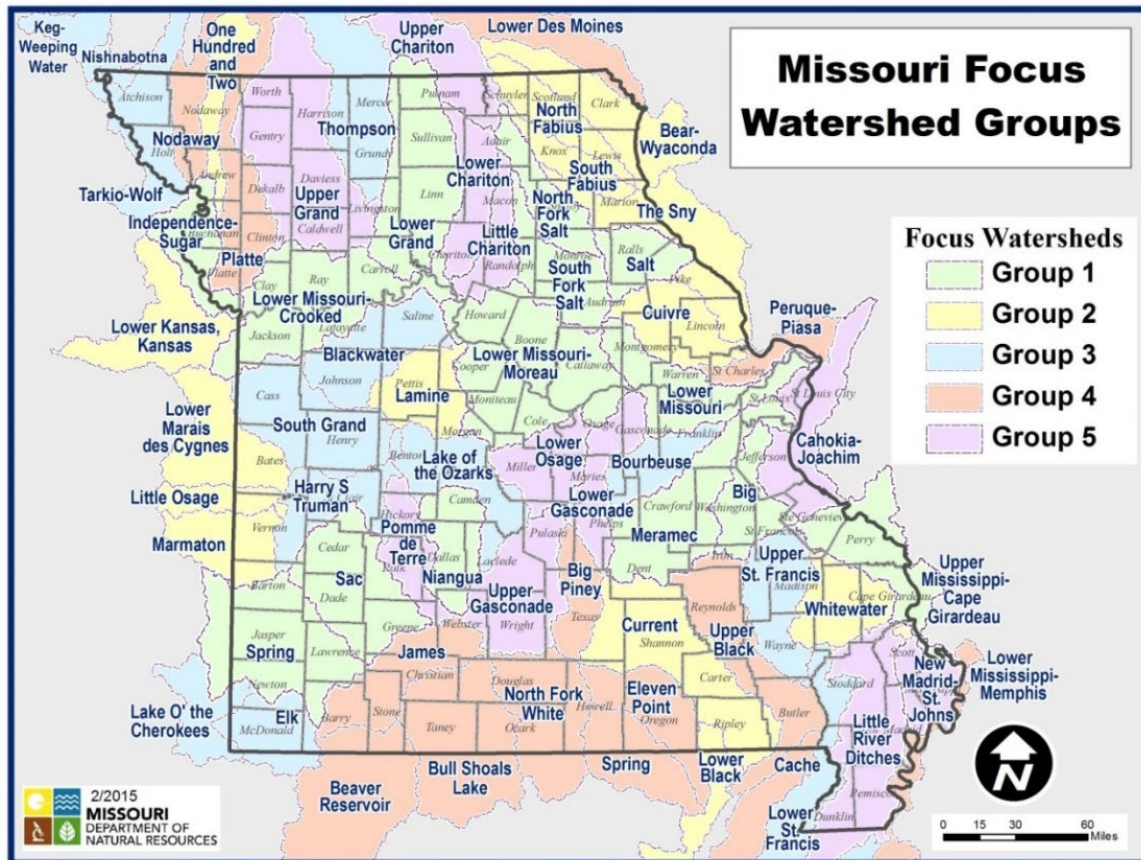


Figure 5. Missouri hydrologic unit code-8 focus watershed groups.

The system aggregated the rankings to provide a master ranking. In addition, it could weight toward one category or another. The three pilot watersheds consistently scored high through different the runs. There was also thought given to ensuring the three pilots were located in different regions of the state for two reasons: to raise awareness of the Missouri Watershed Planning process and watershed protection/restoration statewide, and to get the maximum number of viewpoints and feedback from a wide range of stakeholders – a key component for any pilot in order to provide information that leads to effective full implementation.

Final grouping of all 66 HUC-8 watersheds using the original technical ranking was one piece of the ranking equation. After collecting feedback from the Missouri Watershed Planning Internal Steering Committee, two additional items were considered as part of the final grouping. The first was the Department's Water Protection Program's (WPP) schedule for synchronizing site specific discharge National Pollutant Discharge Elimination System (NPDES) permits. The second was to consider grouping HUC-8 watersheds, to the extent possible, with other HUC-8 watersheds that comprised a larger basin system, such as the Missouri River basin.

The watershed prioritization process may also be used as a framework for implementing EPA’s Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program. This Long-Term Vision encourages States to “review, systematically prioritize, and report priority watersheds or waters for restoration and protection in their biennial

integrated reports to facilitate State strategic planning for achieving water quality goals” for the 2016 §305(b) reporting cycle and beyond. Missouri will follow the statewide watershed prioritization process for the implementation of its §303(d) assessment and NPS pollution loading studies, nutrient loss reduction strategy and/or nutrient trading. The new national water quality reporting measures under development by EPA will be used to measure and assess progress toward established water quality goals.

Addressing watershed priorities is a key component of the MNPSMP. Criteria to be considered in each watershed include: known and potential sources of impairment, pollutant categories, planning and assessment capabilities and ability to share resources. Other individual watershed priorities may include available water quality monitoring data, physical watershed assessments, pollutant load reduction studies, modeling information, funding, and the potential for leveraging and partnering opportunities.

The benefit of using a watershed-based approach is that it focuses on problem solving within defined areas using drainage characteristics as a way of setting boundaries and isolating problem areas. These hydrologically-defined areas are used to better identify sources of impairment and coordinate solutions to correct water quality issues. The concept is advantageous because it integrates several activities within a watershed landscape that affect watershed health by incorporating biology, chemistry, economics and social considerations into the decision-making processes. Watershed-based approaches also consider water quality, flood control, navigation, hydropower, fisheries, biodiversity, habitat preservation, user needs and recreation. Collaborative watershed-based planning helps establish local priorities in the context of national and state goals.

Priority Waters

HIGH QUALITY WATERS

The protection of high-quality waters from the threats of NPS pollution are an eligible use of §319 grant funds for the development and implementation of EPA-accepted 9-element WBPs or alternative plans. In Missouri, high quality waters are designated Outstanding National Resource Waters and Outstanding State Resource waters. These waters are designated in Tables D and E of 10 CSR 20-7.031 of Missouri’s WQS (Tables 10 and 11, respectively). Figure 6 provides a map of the national and state outstanding resource watersheds. Additional protection is afforded for state waters through the antidegradation policy of the Missouri WQS (10 CSR 20-7.031(2)). Missouri’s antidegradation policy consists of a three-tiered system in which outstanding national resource waters and outstanding state resource waters are included under Tier 3.

The following is a summary of the three tiers:

- Tier 1 - 10 CSR 20-7.031(2)(A)
For waters that maintain a level of water quality that protects public health and existing in-stream water uses with no impairment or loss of existing uses.
- Tier 2 - 10 CSR 20-7.031(2)(B)
For waters that maintain a level of water quality better than applicable water quality criteria. Existing levels of water quality are fully maintained and protected unless lowered water quality is necessary to allow important economic and social development

in the area.

- Tier 3 - 10 CSR 20-7.031(2)(C)

There is no lowering of water quality in outstanding state or national resource waters as designated in Tables D and E.

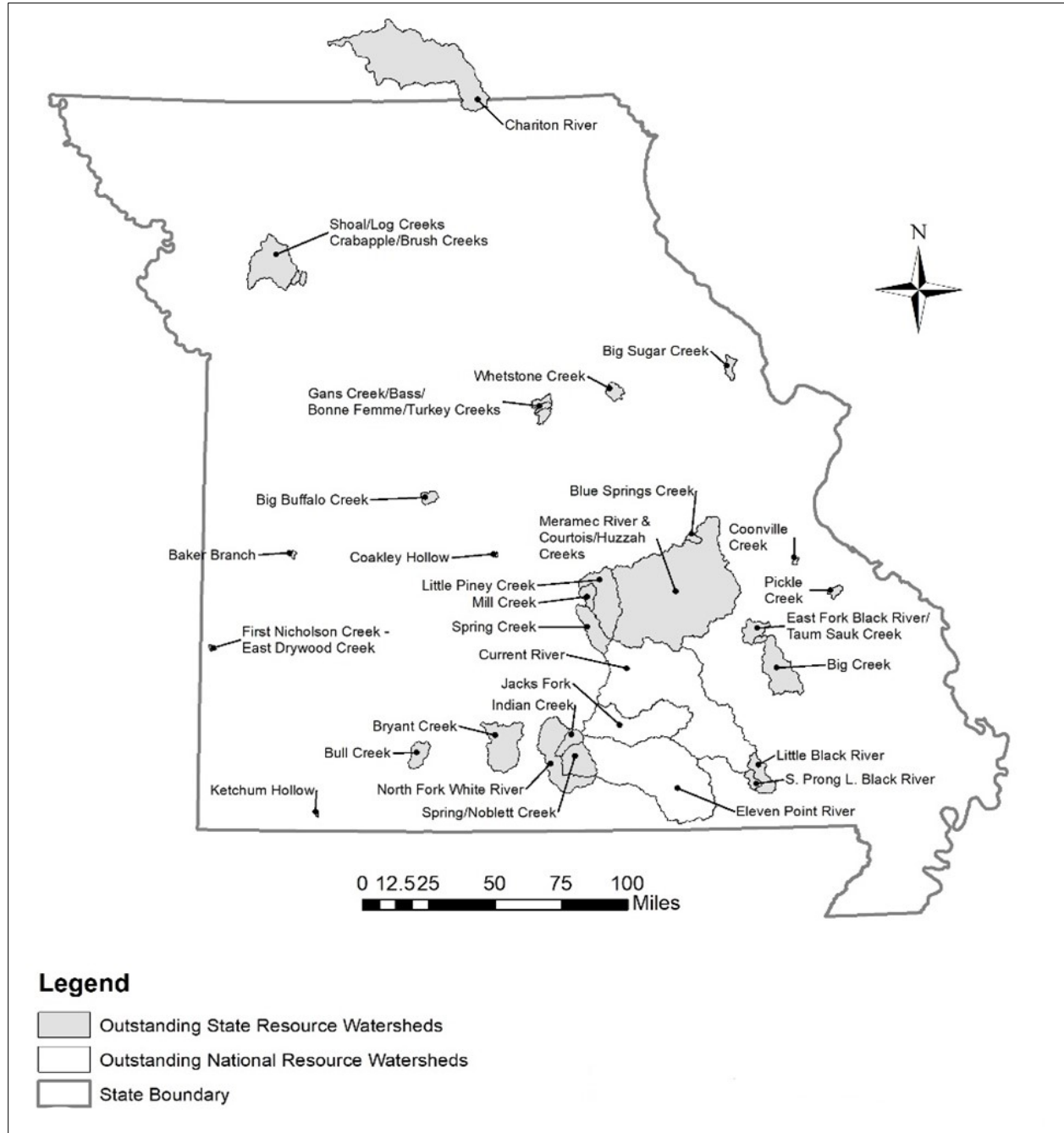


Figure 6. Missouri's national and state outstanding watersheds.

SOURCE WATER

Many of Missouri's surface waters and underground aquifers are used as a drinking water supply. These waters can be threatened by potential contaminants from hazardous waste disposal sites and failing underground storage tanks; nutrient impacts from agricultural and urban runoff; failing onsite wastewater treatment systems; and sediment resulting from land disturbance and stream channelization activities, especially in the karst regions of the state (Figure 7).

Thirty-four percent of Missouri's classified rivers, streams and lakes are designated as a drinking water supply.³⁰ Therefore, it is a priority of the state to protect these sources and ensure safe drinking water for all Missouri citizens.

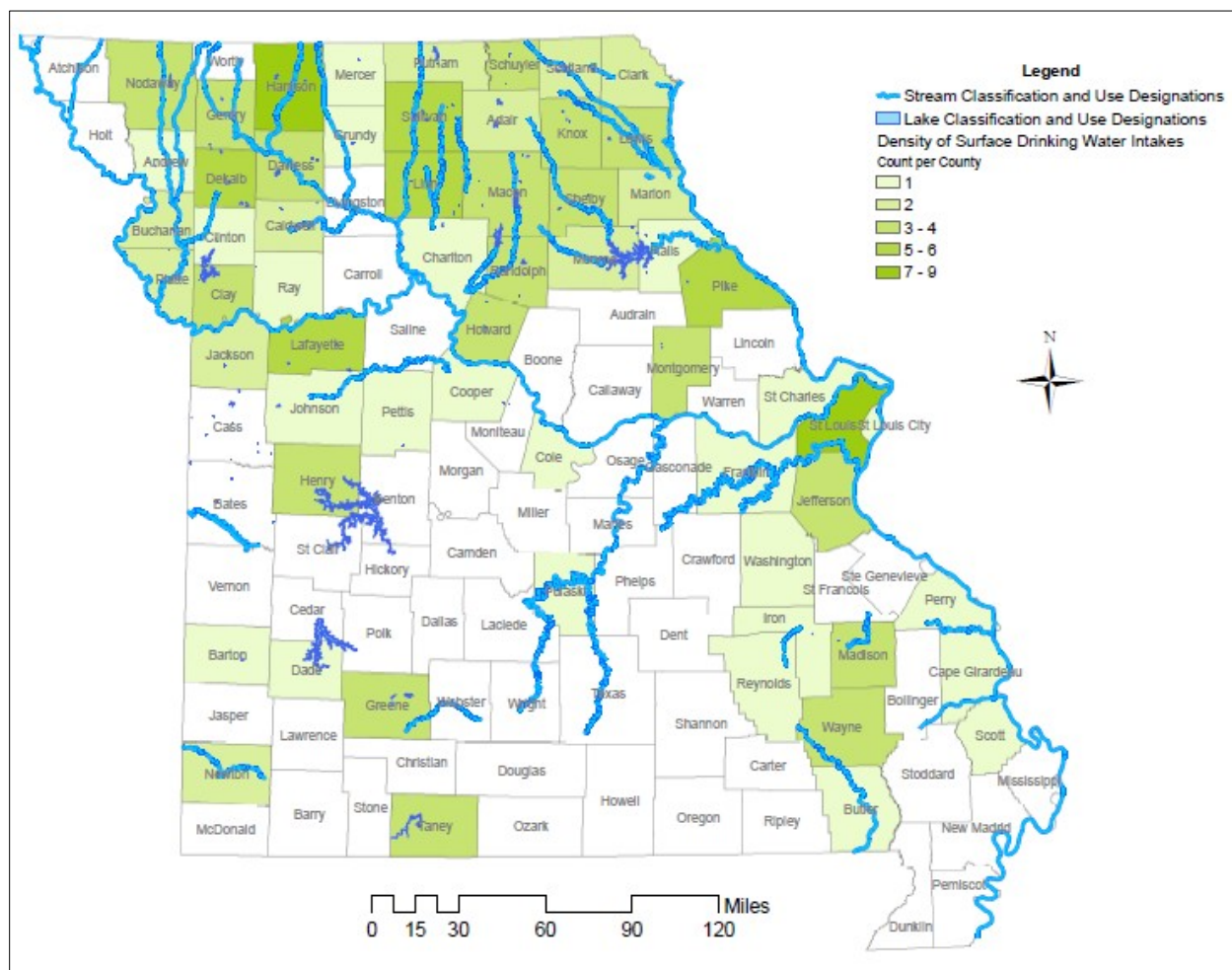


Figure 7. Missouri water bodies designated as a drinking water source.

The Missouri Source Water Protection (SWP) Program³¹ is a voluntary program supporting local efforts to protect drinking water sources. The program offers public water systems an opportunity to learn about a broad range of approaches to protect their water supply and points

³⁰ <https://dnr.mo.gov/document/2018-missouri-integrated-water-quality-report-305b-report>

³¹ <https://dnr.mo.gov/water/what-were-doing/water-planning/source-water-protection>

water suppliers to funding and other resources available to support such local efforts. Appendix 7 provides the status of source water protection plans.

WETLANDS

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions (such as, duckweed, water lilies, cattails, pondweed, reeds, sedges, and bulrush).

Missouri has eight types of natural wetlands: swamps, shrub swamps, forested wetlands, marshes, wet meadows, fens, seeps, pond and lake borders and stream banks.³²

Prior to 1950, wetlands were considered of little value until they had been diked, drained, or filled to render them more adaptable to farming, grazing, or real estate development due to urban sprawl and highway development. Wetlands are now recognized as one of the most productive ecosystems in the world and deserving of protection for their multiple benefits.³³ They serve as habitat for fish and wildlife and recreational areas for hunting, fishing, and watching nature. Wetlands store floodwaters and maintain surface flow during dry periods. They also protect and improve water quality. Of the original 4.8 million acres, Missouri has lost approximately 87 percent of its wetlands, which exceeds the national average.³⁴ Wetlands were a substantial and diverse component of Missouri's landscape, covering almost 11 percent of its surface. Approximately one-half of the wetlands were located in the Bootheel Region of the state.

The last wetland inventory for Missouri was conducted in the early 1980s through the National Wetland Inventory completed by the USFWS³⁵. Within the last two decades, regions of the state have undergone intensive urbanization, and flow regulation along major rivers continues to threaten riparian wetlands. The lack of coordination between agencies, an emphasis on economic development, or the lack of wetland knowledge among decision-makers and the public adversely impacts sensitive and beneficial wetland ecosystems. With slightly more than 10 percent of Missouri's historical wetland areas still existing, it is paramount to focus limited resources on activities that have the greatest impact on the remaining wetlands³⁶. Table 12 provides a list of natural and constructed wetlands located on public properties that could be considered for protection and/or restoration.

Sensitive Areas

KARST AREAS AND GROUNDWATER

Fifty-nine percent of the Missouri's landscape is underlain by thick, carbonate rock units that host a wide variety of karst features, which are characterized by the presence of caves, springs, sinkholes and losing streams (Figure 2). According to the Missouri Speleological Survey, there

³² <https://dnr.mo.gov/water/how-water/state-water/surface-water/wetlands>

³³

³⁴ <https://www.fws.gov/wetlands/Documents/Wetlands-Losses-in-the-United-States-1780s-to-1980s.pdf>

³⁵ <https://www.fws.gov/wetlands/>

³⁶

are now more than 6,000 known caves in Missouri. A spring database maintained by the Department currently lists more than 3,000 springs in the state. Sinkholes have been inventoried in only a few counties: Greene County reports more than 2,500, and Perry County reports more than 7,000. Losing streams have not been fully inventoried statewide, but there are hundreds of miles of losing streams recorded and probably twice that many not recorded³⁷.

The Department considers caves to be important natural resources, not only for their unique beauty and history, but because of their role in a healthy environment. Caves play key roles in groundwater movement, use for drinking water, and serve as habitats for threatened and endangered species. They also help us to better understand the relationships between the surface and ground water environments.

ENDANGERED AQUATIC SPECIES

The USFWS³⁸ and the MDC³⁹ track the various terrestrial and aquatic plant and animal species within each of the aquatic communities that are endangered, threatened or considered a conservation concern.

The 2019 Missouri Species and Communities of Conservation Concern Checklist⁴⁰ contains 16 mollusks, one crustacean, 21 fish, two amphibians and six reptiles that are listed as endangered by the state. Table 6 provides the status of the state endangered aquatic species along with its federal listing. All species are listed by their scientific and common names. Funding opportunities under the §319 NPS program are available for the development and implementation of WBPs that address NPS impairments and threats to water quality where a threatened and/or endangered aquatic species is known to exist.



Photo 3. Cave salamander - Fisher Cave at Meramec State Park

³⁷ <https://dnr.mo.gov/land-geology/geology/karst-missouri>

³⁸ <https://ecos.fws.gov/ecp/report/species-listings-by-state?stateAbbrev=MO&statusCategory=Listed&s8fid=112761032792&s8fid=112762573902>

³⁹ <https://mdc.mo.gov/field-guide/statuses?status=994>

⁴⁰ <https://archive.org/details/2019MOSpeciesOfConcern>

Table 6. Status of state and federal endangered aquatic species in Missouri.

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FEDERAL STATUS
MOLLUSKS			
<i>Alasmodonta viridis</i>	Slippershell Mussel	Endangered	
<i>Antrobia culveri</i>	Tumbling Creek Cavesnail	Endangered	Endangered
<i>Elliptio crassidens</i>	Elephant-ear	Endangered	
<i>Epioblasma curtisii</i>	Curtis Pearly Mussel	Endangered	Endangered
<i>Epioblasma triquetra</i>	Snuffbox	Endangered	Endangered
<i>Lampsilis abrupta</i>	Pink Mucket	Endangered	Endangered
<i>Lampsilis higginsii</i>	Higgins Eye	Endangered	Endangered
<i>Lampsilis rafinesqueana</i>	Neosho Mucket	Endangered	Endangered
<i>Leptodea leptodon</i>	Scaleshell	Endangered	Endangered
<i>Margaritifera monodonta</i>	Spectaclecase	Endangered	Endangered
<i>Plethobasus cyphus</i>	Sheepnose	Endangered	Endangered
<i>Potamilus capax</i>	Fat Pocketbook	Endangered	Endangered
<i>Quadrula fragosa</i>	Winged Mapleleaf	Endangered	Endangered
<i>Reginaia ebenus</i>	Ebonyshell	Endangered	
<i>Simpsonaias ambigua</i>	Salamander Mussel	Endangered	
<i>Theliderma cylindrical</i>	Rabbitsfoot	Endangered	Threatened
CRUSTACEANS			
<i>Cambarus aculabrum</i>	Benton County Cave Crayfish		Endangered
FISH			
<i>Acipenser fulvescens</i>	Lake Sturgeon	Endangered	
<i>Amblyopsis rosae</i>	Ozark Cavefish	Endangered	Threatened
<i>Cottus specus</i>	Grotto Sculpin		Endangered
<i>Crystallaria asprella</i>	Crystal Darter	Endangered	
<i>Etheostoma fusiforme</i>	Swamp Darter	Endangered	
<i>Etheostoma histrio</i>	Harlequin Darter	Endangered	
<i>Etheostoma nianguae</i>	Niangua Darter	Endangered	Threatened
<i>Etheostoma parvipinne</i>	Goldstripe Darter	Endangered	
<i>Etheostoma whipplei</i>	Redfin Darter	Endangered	
<i>Forbesichthys agassizii</i>	Spring Cavefish	Endangered	
<i>Hybognathus hayi</i>	Cypress Minnow	Endangered	
<i>Notropis maculatus</i>	Taillight Shiner	Endangered	
<i>Notropis sabinae</i>	Sabine Shiner	Endangered	
<i>Notropis topeka</i>	Topeka Shiner	Endangered	Endangered
<i>Noturus eleutherus</i>	Mountain Madtom	Endangered	
<i>Noturus placidus</i>	Neosho Madtom	Endangered	Threatened
<i>Percina nasuta</i>	Longnose Darter	Endangered	

(Table 6 continued)

SCIENTIFIC NAME	COMMON NAME	STATE STATUS	FEDERAL STATUS
FISH (continued)			
Platygobio gracilis	Flathead Chub	Endangered	
Scaphirhynchus albus	Pallid Sturgeon	Endangered	Endangered
Scaphirhynchus platyrhynchus	Shovelnose Sturgeon		Threatened/SA
Umbra limi	Central Mudminnow	Endangered	
AMPHIBIANS			
Cryptobranchus a. alleganiensis	Eastern Hellbender	Endangered	
Cryptobranchus a. bishop	Ozark Hellbender	Endangered	Endangered
REPTILES			
Deirochelys reticularia miaria	Western Chicken Turtle	Endangered	
Emydoidea blandingii	Blanding's Turtle	Endangered	
Kinosternon flavescens	Yellow Mud Turtle		
	Mississippi	Endangered	
Nerodia cyclopion	Green Watersnake	Endangered	
Sistrurus catenatus	Eastern Massasauga	Endangered	Threatened
Sistrurus tergeminus tergeminus	Prairie Massasauga	Endangered	

Other Priority Waters

CATEGORY 1 WATERS

Category 1 waters are defined in the §305(b) report as those waters that fully support all of its designated uses. As a proactive measure, the §319 NPS program considers these waters eligible for protection allowing these waters to continue to meet all their designated uses into the future. A list of Category 1 waters is provided in Table 9.

ECONOMICAL AND RECREATIONAL WATERS

Missouri is home to several large recreational lakes located throughout the state that are highly-valued public resources. Through tourism and recreational activities (e.g., boating, fishing and swimming), these lakes generate much revenue for local economies and the state. Visitors for water-based activities in Missouri are increasing by about 2.7 percent per year and total visitor expenditures increase by 5.4 percent per year⁴¹. According to the 2018 Missouri Division of Tourism annual report⁴², 42 million people visited the state, generating a \$17.2 billion benefit to the tourism industry, with Branson (Table Rock Lake, Bull Shoals, and Lake Taneycomo) and the Lake of the Ozarks being within the top five destinations visited. Therefore, safeguarding

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⁴² <https://mdt-visitmo-cdn.s3.amazonaws.com/industry-files/annual-reports/1555106172-mdt-annual-report-fy18.pdf>

these vital recreational and economic resources through water quality standards and implementation of BMPs is critical to the vitality of the state's economy.

CHAPTER 6: NPS PARTNERSHIPS

The Missouri §319 NPS Program is dependent upon the contribution and coordination with many partners to achieve the goals and objectives stated in the MNPSMP. A stakeholder committee representing numerous interest groups was convened to develop the initial MNPSMP in 1989. These organizations have continued to work independently or together to reduce NPS pollution. As stated in Goal 1, the Department will continue to seek partner commitments and participation in NPS efforts to allow for opportunities to leverage and collaborate on processes and initiatives to reduce NPS impacts. Maximizing the participation of many partnerships is a continuous process. Gaining and maintaining partnerships can be a challenge due to differing priorities, planning timelines, and limited resources.

Committed technical and financial assistance is available from several agencies to address NPS pollution. Appendix 3 provides a list of state and federal partners who conduct various NPS activities (e.g. planning, implementation, water quality monitoring and modeling, and education and outreach). The list is not comprehensive, but provides the potential for engagement when opportunities arise.

Stakeholder engagement and input can also be obtained through workgroup opportunities such as those listed below:

Department-sponsored groups comprised of representatives from federal, state and local agencies, organizations and citizens, such as:

- The Water Protection Forum (WPF) is used to present and discuss the Department's current water quality issues. A wide diversity of interests is represented, including point and NPS pollution, agriculture, municipalities and industries. The Missouri §319 NPS Program updates are provided at WPF meetings. More information about the WPF can be found at: <http://dnr.mo.gov/env/wpp/cwforum/index.html>.
- The Missouri Nutrient Loss Reduction Strategy Committee (MNLRS) is a large, diverse stakeholder group chaired by the Department that participated in development of the Missouri Nutrient Loss Reduction Strategy (MNLRS). The primary goals of this committee were to develop a comprehensive, integrated state-level nutrient loss reduction strategy that was science-based, effective, achievable and economically sustainable. This committee meets as necessary to coordinate implementation of the MNLRS. The MNLRS was completed in December 2014 and is available at: <https://dnr.mo.gov/water/what-were-doing/water-planning/nutrient-loss-reduction-strategy>.
- Collaborative Adaptive Management (CAM) process. The CAM committee members may include, but not limited to state, federal, and local agencies, universities, and local citizens, who work together to assess and address watershed

concerns and challenges, along with setting goals for various actions to be completed.

Locally led watershed or regional meetings, such as:

- OneSTL⁴³ is a collaborative effort to encourage and support greater sustainability within the eight-county St. Louis region. OneSTL is made up of various partners located throughout the St. Louis region focused on integrated planning to create economic and sustainable communities.
- East-West Gateway Water Resources Committee⁴⁴ is a membership of representatives from industry, water and sewer districts, communities, government agencies, universities, environmental groups, and the general public. This committee works together on actions to improve water quality in the greater St. Louis region.

CHAPTER 7: MISSION, GOALS, OBJECTIVES, STRATEGIES, AND MILESTONES PERFORMANCE MEASURES

The mission of the Missouri §319 NPS Program is: *“Protect and improve the quality of the state’s water resources using locally led approaches to address nonpoint source pollution impairments.”* The MNPSMP provides the state’s strategies for addressing NPS pollution pursuant to §319 of the federal CWA. This plan is intended to serve as a voluntary tool for assisting stakeholders with the NPS challenges and issues facing Missouri. By implementing a strategy to achieve NPS goals, objectives, and milestones, this plan will enhance protection and restoration of Missouri’s water resources. The MNPSMP’s goals, objectives and strategies are discussed on the following pages, and Table 14 provides a consolidated list of the goals, objectives, measures, and outcomes. It also includes the timeframe of the objective, funding source, and responsible party.



Photo 4. Aerial photo taken over Pettis County

⁴³ <http://www.onestl.org/>

⁴⁴ <https://www.ewgateway.org/community-planning/environmental/water-resources/>

Goal 1 - Leveraging and Collaboration

Utilize partnerships to leverage available resources for NPS management.

Background

Collaborating with state, federal, local, and private partners is critical for the success of MNPSMP. Coordination with a variety of partners increases the available resources needed to address NPS pollution and for the preservation and restoration of Missouri's waters that are impaired or threatened by NPS pollution. Over the next five years, the Missouri §319 NPS Program will continue to coordinate with partners on a regular basis, provide technical and financial assistance for watershed-based and effective water quality monitoring, and support implementation of management practices in watersheds with EPA-accepted 9-element WBPs. The long-term objective of this effort is to track watershed progress over time and report shared successes. To do so, the Department is looking to reestablish the Water Quality Coordinating Committee meetings to allow for interested partners and stakeholders to discuss NPS initiatives, planning, water quality monitoring, and implementation projects. During the 2020-2025 MNPSMP planning meetings, it was determined that regularly scheduled meetings were needed to learn what other organizations are doing and facilitate NPS coordination activities (see Appendix 3).

Missouri Soil and Water Conservation Program (SWCP)

The Missouri SWCP is funded by the Parks, Soils and Water sales tax which has been continuously approved by voters since 1984. From the initial passage of the Parks, Soils and Water sales tax through state fiscal year 2018, Missouri has prevented more than 185 million tons of soil erosion, which has improved the water quality of streams and lakes and helped to keep Missouri farmland productive. The primary goal of the SWCP⁴⁵ is to assist farmers and landowners with soil and water conservation by providing partial reimbursement (cost-share) for a number of agricultural construction and management practices. These voluntary practices are designed to address resource concerns such as grazing, irrigation, woodland, pest and nutrient management, animal waste, ground and surface water, and soil erosion. With 40 different practices available, the SWCP can help farmers and landowners address a variety of resource concerns. The program helps support a soil and water conservation district in each of Missouri's 114 counties. Each district provides technical and financial assistance to local farmers and landowners.

The §319 NPS Program will coordinate with the SWCP to track all of the voluntary conservation practices being implemented in watersheds with EPA-accepted 9-element WBPs. Practices implemented in critical areas of these watershed will be used to documenting state-funded NPS activities.

⁴⁵ <https://dnr.mo.gov/land-geology/businesses-landowners-permittees/financial-technical-assistance/soil-water-conservation-cost-share-practices>

U.S. Department of Agriculture (USDA) Farm Bill Programs and Initiatives

Although national priorities are set by the Secretary of Agriculture and may vary according to the administrative governance in place, the protection of soil and water are of paramount importance to the USDA. All USDA-NRCS programs and operations are subject to congressional authorization through the federal budgeting process (e.g., the “Farm Bill”). Although program administration and funding levels may fluctuate from year to year, future conservation programs will remain available to the public with passage of the current and future Farm Bills. The MNPSMP will continue to partner with NRCS to restore water quality impairments caused by agricultural NPS runoff.

- **National Water Quality Initiative (NWQI)**

Since FFY 2012, USDA-NRCS and EPA have collaborated on a national effort to increase the implementation of voluntary conservation practices in critical watersheds, called the NWQI⁴⁶. The goal of this program is to implement conservation practices within impaired water bodies to improve water quality and aquatic habitats.

The NWQI is a partnership between NRCS, state water quality agencies, and EPA to identify and address impaired water bodies through voluntary implementation of agricultural conservation practices. NRCS provides funding through the state USDA-NRCS EQIP for financial and technical assistance in priority watersheds. The state water quality agencies provide resources and support for water quality monitoring to track progress over time.

During FFY 2018, a NWQI watershed assessment was completed for Lamar Lake in Lamar, Missouri (HUC #110702070206). The water body was selected because it has an EPA-approved TMDL. Additional selection criteria included a variety of factors, such as: sources of impairment at least partially due to agricultural runoff; a primarily agricultural land-use; a perceived willingness of landowners or producers to implement conservation practices; an EPA-accepted WBP and a location(s) identified as a critical area; an active locally led watershed group; an adequate water quality monitoring program to measure change; and a waterbody designated as a drinking water source).

The NRCS completed a watershed assessment of the Lamar Lake watershed through a contract with the Ozark Environmental Water Resource Institute (OEWRI) to identify sources of impairment. The NRCS and the Missouri SWCP are jointly providing cost-share incentives for willing landowners to voluntarily implement agricultural conservation practices that address the nutrient impairments and jointly funded a position to assist in this watershed. The §319 NPS program is committed to support water quality monitoring efforts for the Lamar Lake watershed.

For FFY2019, and as part of the NWQI readiness phase, two additional watersheds were included: headwaters of Petite Saline Creek (HUC# 103001020401) and Little Hunting Slough-Black River (HUC # 110100070805). The Department will continue to work with NRCS to develop an effective water quality-monitoring plan to identify sources and measure

⁴⁶ <https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/water/?cid=stelprdb1047761>

improvements for these watersheds and the NWQI projects planned and implemented over the next five years.

- **Regional Conservation Partnership Program (RCPP)**

The USDA-NRCS and state, local and regional partners coordinate resources through the RCPP to help landowners and producers install and maintain conservation activities in select project areas. Partners leverage RCPP funding in project areas and report on the benefits achieved.

There are several new and ongoing RCPP projects in Missouri⁴⁷. In FY2016, the Department entered into a cooperative agreement with the Missouri Corn Merchandising Council in partnership with the Missouri Soybean Merchandising Council to form a collaborative monitoring partnership that is conducting farm-scale, edge-of-field agricultural runoff monitoring of nutrients and sediment. The objective of this project is to study the effectiveness and benefits of agricultural conservation practices and support water quality efforts to meet state soil and water stewardship goals. The Missouri NPS Program provided financial support of \$200,000 per year over a five-year timeframe for the collection of edge-of-field monitoring data. Support for these efforts are being continued beyond five years to allow for sufficient water quality data to be collected for statistical analysis.

- **Mississippi River Basin Healthy Watersheds Initiative (MRBI)**

Because the Mississippi River is North America's largest river, flowing over 2,300 miles through America's heartland to the Gulf of Mexico, and is the third largest watershed in the world, it is a national priority for the NRCS under the MRBI⁴⁸. Elevated levels of nutrients and sediment can negatively affect the quality of life for millions of people who live in and rely on the Mississippi River Basin. Elevated nutrient levels are also contributing to the Gulf of Mexico hypoxic (low-oxygen) zone. To address these agricultural sources of nutrients and sediment, the NRCS works with farmers and conservation partners to implement conservation practices in focused watersheds that help trap sediment and reduce nutrient runoff to improve the overall health of the Mississippi River.

In 2009, 13 states located in the Mississippi River Basin participated in the MRBI. The initiative was supported through various Farm Bill programs, including the Environmental Quality Incentives Program (EQIP) and the Agricultural Conservation Easement Program (ACEP) to help landowners implement voluntary conservation practices. The overall goals of MRBI were to improve water quality, restore wetlands, and enhance wildlife habitat, while ensuring economic viability of agricultural lands. MRBI used a small watershed approach. Avoiding, controlling and trapping practices were implemented to reduce the amount of nutrients and sediment flowing from agricultural land into waterways and to improve the resiliency of working lands.

In FY2015 and 2016, the Missouri's MRBI targeted watersheds were the Bear Creek/Wet Yellow Creek (Linn County), Upper Buffalo Creek Ditch (Dunklin County), Lewis and

⁴⁷ <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/rcpp/>

⁴⁸ <https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/initiatives/?cid=stelprdb1048200>

Clark/Bee Creeks (Buchanan and Platte Counties), Upper Birds Point (Mississippi County). These watersheds will continue to receive funding in FY2019. The Missouri MRBI priority areas targeted for water quality assessments in FY2019 include: Crane Creek-Dry Creek (Bollinger and Cape Girardeau Counties); headwaters of Indian Creek, Cuivre River and Coon Creek (Audrain, Lincoln and Montgomery Counties); Spring, Turkey and Long Branch Creeks (Chariton, Linn, and Sullivan Counties); and Upper/Middle Apple Creek (Cape Girardeau and Perry Counties). Currently, the Missouri NPS Program is not actively partnering on any of these projects except those with EPA-accepted 9-element WBPs, but it will provide support as needed or requested throughout the next five years.

Missouri's Nutrient Loss Reduction Strategy and Gulf Hypoxia Task Force

The Hypoxia Task Force was formed in 1997 and consists of federal and state agencies and tribes. The Department represents the State of Missouri on the task force and its coordinating committee. The role of the task force is to provide executive level direction and support for coordinating the actions of participating organizations in reducing nutrient loads within the Mississippi River/Atchafalaya Basin (MARB). The MARB encompasses both the Mississippi and Atchafalaya Basins and is classified as the third largest watershed in the world. In 2008, the Hypoxia Task Force released the Gulf Hypoxia Action Plan 2008 for Reducing, Mitigating, and Controlling Hypoxia in the Northern Gulf of Mexico and Improving Water Quality in the Mississippi River Basin.⁴⁹ The action plan reflects the Task Force's efforts to track progress, update the science, and adapt actions to improve the effectiveness of the efforts throughout the basin. It also reiterates the Task Force's long-term goals and continues its commitment to implement an adaptive management approach in order to reduce the size of the impact of the Gulf hypoxic zone and improve water quality in the basin.

As discussed previously, the MNLRS was developed over a 3 year period from 2011 through 2014 and was updated in 2018 and 2020. The development of state-level nutrient reduction strategies is not federally mandated, but since 2008, it has been the top priority of the 12 states, including Missouri, that are members of the Mississippi River/Gulf of Mexico Hypoxia Task Force⁵⁰ (Hypoxia Task Force). The MNLRS⁵¹ uses an adaptive management approach to reduce nutrient pollution from both point and NPS pollution. This strategy proposes a set of recommended actions to improve water quality in Missouri while also reducing nutrients transported downstream to the Gulf of Mexico.

Nutrient reduction remains a priority of the Missouri §319 NPS Program. The program will continue to provide technical support and seek opportunities for collaboration and partnerships to implement land management practices in priority watersheds to reduce the nutrient and sediment loads to the Missouri and Mississippi River Basins.

⁴⁹ https://www.epa.gov/sites/production/files/2015-03/documents/2008_8_28_msbasin_ghap2008_update082608.pdf

⁵⁰ <http://water.epa.gov/type/watersheds/named/msbasin/index.cfm>

⁵¹ <https://dnr.mo.gov/water/what-were-doing/water-planning/nutrient-loss-reduction-strategy>

Upper Mississippi River Basin Association (UMRBA)

The Upper Mississippi River Basin Association (UMRBA)⁵² is a regional, interstate organization formed by the Governors of Illinois, Iowa, Minnesota, Missouri, and Wisconsin to coordinate the states' river-related programs and policies, and to work with federal agencies that have river responsibilities. UMRBA is involved with programs related to commercial navigation, ecosystem restoration, water quality, aquatic nuisance species, hazardous spills, flood risk management, water supply, and other water resource issues.

The UMRBA supports and provides staff for two work groups: the Water Quality Task Force and the Water Quality Executive Committee, which provide forums for consultation among the five state water quality management agencies, as well as EPA Regions 5 and 7. Both groups address issues directly related to the states' CWA responsibilities on the Mississippi River as a shared interstate resource, including monitoring, waterbody assessments, listings of impaired waters, and TMDLs. The distinction between the groups is that the Task Force examines issues at a technical/program level, while the Executive Committee functions at a policy level and seeks to implement the approaches identified by the Task Force. The efforts of these groups have enhanced interstate cooperation in CWA implementation and resulted in a number of reports regarding Upper Mississippi River water quality issues.

The Department provides technical support for both the Water Quality Task Force and Water Quality Executive Committee by participating in quarterly meetings. The Missouri §319 NPS Program will continue to support various CWA activities focusing on monitoring, planning, and implementation of management practices to reduce NSP impacts. The reduction of nutrients and the occurrence of harmful algal blooms is a priority of the MNPSMP and allows the Missouri §319 NPS Program to provide support, as needed, to address these issues.

The Department will seek additional opportunities to partner with: the Department's Financial Assistance Center (FAC) for additional NPS project funding opportunities; MDC to look for overlap and similarities in priorities between the Missouri §319 NPS Program and MDC conservation opportunity priority areas; and the USACE and EPA to determine if feasibility studies can be used as alternatives to an EPA 9-element WBP. Future efforts to coordinate with the Federal Emergency Management Agency (FEMA) will be considered to prioritize areas to build or increase flood resiliency through the implementation of various conservation management practices that encourage stormwater infiltration and reduce the number and magnitude of flood events.

Objectives

- Leverage the implementation of SWCP conservation activities.
 - Annually track SWCP conservation practices implemented in watersheds with EPA-accepted 9-element WBPs.

⁵² <http://www.umrba.org/>

- Upload eligible leverage projects into the EPA’s online Grants Reporting and Tracking System (GRTS) (also reported under Objective 4.3).
- Partner with USDA-NRCS on the NWQI for as long as the initiative remains a national priority.
 - Continue to provide SWCP technical support and participate at State Technical Committee meetings and workgroups.
 - Continue to coordinate with NRCS and the Department’s Watershed Protection Section (WPS) Monitoring and Assessment Unit (MAU) to schedule monitoring for NWQI projects.
 - Continue to coordinate with NRCS and the WPS MAU to develop a monitoring strategy for the two NRCS ‘readiness phase’ projects.
 - Coordinate with NRCS on at least an annual basis to share in the decision-making on the next steps regarding the initiatives described above.
- Support the implementation of the State Nutrient Loss Reduction Strategy.
 - Continue to provide technical support as needed at scheduled meetings.
 - Continue to include nutrient reduction strategies into §319 NPS WBP efforts, where priority areas overlap.
 - Provide technical and financial support for the implementation of conservation practices that reduce nutrient inputs and related water quality impacts within the Missouri and Mississippi River basins.
- Provide technical support to the UMRBA.
 - Continue to attend Executive Committee and Water Quality Task Force meetings.
- Seek other leveraging and collaboration opportunities to address NPS.
 - Meet with the Department’s FAC to seek collaboration opportunities through the SRF Program.
 - Meet with MDC to seek collaboration and leveraging opportunities in priority watersheds.
 - Continue to provide technical support and seek collaboration opportunities with the Department’s Wetland Program and Missouri Wetland Program Plan updates⁵³.
 - Whenever possible, promote NPS projects in areas where USACE feasibility studies and restoration plans have been completed.
- Partners NPS outreach efforts.
 - Explore opportunities to leverage outreach regarding NPS pollution issues and efforts to protect high quality streams and actions that can be taken to restore threatened and impaired waters (also reported under Goal 1, Objective in 1.6.a of Table 14)
- Re-establish the Water Quality Coordinating Committee Meetings.
 - Survey partners and stakeholders to determine the best times to hold meetings, frequency of meetings and NPS discussion topics.
 - Host meetings.

⁵³ <https://dnr.mo.gov/document-search/missouri-wetland-program-plan-2013-2018>

Goal 2 - Monitoring and Assessment

Monitor and Assess Missouri Waters for NPS Impairments and Improvements.

Background

The Department's water quality monitoring strategy⁵⁴ for 2015-2020 describes Missouri's current monitoring program goals and provides an overview of how Missouri plans to address each of the monitoring objectives in an effort to maintain alignment with CWA goals and objectives. A list of core and supplemental water quality indicators utilized by the state for assessing water quality monitoring needs is provided in Appendix 9.

Missouri's water quality monitoring strategy uses several types of monitoring designs to evaluate and characterize NPS impacts throughout the state and are summarized below. Many of these activities are also reported annually under the §319 NPS Performance Partnership Grant (PPG) and are noted in the following text.

- Fixed station-monitoring. This program collects a selected group of analytes at fixed sites on a regular schedule. Data is typically collected at each site for several years. Fixed station monitoring is often used to obtain background or baseline information for watershed planning or TMDL development. This type of monitoring is used to characterize a small watershed or for follow-up monitoring after restoration activities have been implemented.
- Screening level monitoring. Screening level monitoring includes a number of low intensity, short duration monitoring activities and/or longer-term monitoring through volunteer monitoring efforts. These activities often include, but are not limited to, the collection of monitoring data using field kits, onsite measurements, and visual stream observations. These data collection efforts provide the advantage of monitoring greater numbers of sites at a reduced monitoring expense, and provides a way to screen sites for follow-up monitoring. Data generated at long-term volunteer monitoring sites can be used to determine water quality trends or understand watershed health.
- Probability-based surveys. This program is based upon probabilistic site selection using simple random, stratified, or nested designs. They are designed for making statistically valid inferences about the condition of all the water types within the state over time.
- Special projects. Special projects often include monitoring that helps characterize nutrient loads to Missouri's rivers and streams and contributions to the Gulf Hypoxia; supports national initiatives such as the NWQI; and other priority monitoring projects. This monitoring is often scheduled through the fixed station-monitoring program.
- Section 319 NPS projects. §319 NPS projects often monitor water quality to obtain additional information about their watershed of interest by using a variety of monitoring methods (e.g. chemical, physical, biological). Section 319 NPS projects also conduct baseline monitoring for watershed planning and pre- and post- monitoring to determine the effectiveness of implementation efforts. The sampling plan is documented in a

⁵⁴ <https://dnr.mo.gov/document-search/proposal-water-quality-monitoring-strategy-missouri-ffy-2015-2020>

quality assurance project plan (QAPP) and is funded with §319 NPS project funds.

Fixed Station Network

The objective of fixed station monitoring is to characterize or reference water quality conditions, daily flow, seasonal water quality variations and their underlying processes, assess time trends, and check for compliance with water quality standards. Missouri's fixed station network is designed to obtain water chemistry, sediment, fish tissue and biological monitoring sites among the major physiographic and land use areas of the state. The data are used to determine the overall health of the waterbodies through the §303(d) and §305(b) process, nutrient loads, and to be used for watershed planning and to conduct watershed trend analyses.

The fixed station stream network monitoring components used by the Missouri §319 NPS Program are described below.

- **Ambient Stream Network Program**

The current fixed station ambient stream network includes approximately 72 sites that are monitored between four and 12 times annually by the USGS for a variety of physical, chemical and bacteriological constituents. Four of these sites are also sampled at less frequent intervals for pesticides. Approximately half of the monitoring sites are located on stream segments classified as fifth order streams or larger (medium or large rivers). Seven sites are located on great rivers (stream orders 7-8), including two sites on the Missouri River where data sondes are deployed to collect continuous data from spring through autumn. Thirteen sites are classified as small streams (stream order 3-4) and one is classified as very small (stream order 1-2). Five springs are also monitored four to six times per year. The fixed station USGS sites supported by the Department through the WPP are listed in Appendix 10. The annual cost of this program is approximately \$1,366,457 using Clean Water State Revolving Fund (SRF) Administrative Non-program Income, Section 106, and as needed, with §319 NPS PPG funds.

- [Upper Mississippi River Restoration Program \(UMRRP\)](#)

A large consortium of state (i.e. MN, WI, IA, IL, MO) and federal (e.g. USACE, USGS, USFWS) entities partner to monitor the Upper Mississippi River System for many parameters that reflect water quality, habitat, fish and aquatic vegetation communities. Long Term Resource Monitoring data are primarily indexed on community structure, and are tracked through periodic status and trends reporting over decades since program development. In addition to providing long-term monitoring of the main-stem Mississippi River, unique habitats (i.e. tributary, floodplain, and backwater) are monitored throughout the system. Furthermore, complementary components (e.g. Land Cover, Bathymetry, GIS data) provide holistic data for system-wide inference. Supportive research on macroinvertebrates, mussels, and other terrestrial and aquatic dependent communities can be considered under Science in Support of Restoration and Management. Additional elements of the UMRRP include Strategic planning; Habitat Rehabilitation and Enhancement Projects and Habitat Needs Assessment. An element of the UMRRP, is [Long Term Resource Monitoring \(LTRM\)](#). The goals of the LTRM is to develop a better understanding of the ecology of the Upper Mississippi river System and

its resource problems, monitor resource change, develop alternatives to better manage the Upper Mississippi River System, and provide for the proper management monitoring information. The U.S. Army Corps of Engineers funds the program in Missouri through a partnership with the Missouri Department of Conservation through the USGS-UMESC at an estimated annual cost of \$450,000.

- **Wadeable Streams Program**
The Department's Environmental Services Program (ESP) supports the WPP under the Wadeable Streams QAPP and monitors water quality at fixed sites from two to 24 times annually for a select list of physical and chemical constituents. Most of these streams are fifth order or smaller (categorized as small to medium rivers). The estimated annual cost of this program is \$269,847 using §106 PPG and §319 PPG funds, and non-administrative SRF. Approximately 40-50 stream sites are monitored annually for NPS TMDL load allocation studies or §319 NPS planning and implementation projects.
- **State Outstanding Resource Waters Long-Term Monitoring**
Since approximately 2005, cooperation between the Missouri Department of Natural Resource, Division of State Parks, the WPP, and the Missouri §319 NPS Program have supported the collection and analyses of stream samples from state outstanding resource waters that flow through Missouri State Parks. The purpose of the monitoring is to track ambient water quality conditions. State Parks staff collects surface water samples from five sites a total of three times per year. Water samples are submitted to the Department's ESP Chemical Analysis Section. The total annual cost of the sample analyses is \$2,370 using §319 NPS PPG funds.
- **Abandoned Mine Lands Long-Term Monitoring**
Since approximately 1997, 11 streams and 22 sites have been monitored two times per year to track long-term water quality conditions from historical land reclamation sites to document if designated uses are still being met. If conditions should change, coordination with the Department's LRP will be completed to address the water quality concern. The total annual cost of the sample analyses is approximately \$5,836 using §319 NPS PPG funds.
- **Lake Monitoring Program**
Through cooperative agreements, the Department partially funds two lake monitoring programs by the University of Missouri-Columbia: Statewide Lake Assessment Project (SLAP) and Lakes of Missouri Volunteer Monitoring Program (LMVP)⁵⁵. The SLAP monitors approximately 75 lakes four times each during the summer for nutrients, chlorophyll, volatile and non-volatile suspended solids, and secchi depth. The monitoring sites are located at one site on the lake and near the dam. The LMVP typically collects data four to six times per year on approximately 66 lakes, including multiple sampling sites on larger reservoirs for nutrients, chlorophyll, and secchi depth. The combined

⁵⁵ <http://www.lmvp.org/>

annual cost of these two programs is approximately \$390,000 using §319 NPS project funds. A list of lakes monitored by these programs is provided in Appendix 11.

- Sediment Monitoring

Toxic substances can concentrate in stream sediments and impact aquatic organisms that live or feed within the sediment/water interface. Chemical testing of sediments represents a better option than water quality sampling for characterizing the toxicity potential of a waterbody to aquatic biota. Sediment monitoring assists in determining designated use attainment (e.g. aquatic life), §303(d) impaired waters, and developing TMDLs.

In Missouri, sediment toxicity has been linked to mineral mining activities and urbanization. Streams draining heavily-mined landscapes (such as the Tri-State Mining District, Old Lead Belt and Viburnum Trend) or receiving stormwater runoff from highly urbanized areas of the state have been found to be impaired for heavy metals and polycyclic aromatic hydrocarbons (PAHs) in stream substrate. These mining sites may be in various operational stages. Many sites have been abandoned with levels of remediation ranging from completely remediated to abandoned with no site controls (i.e. stormwater retention basins, banks with rip-rap, vegetated slopes, remediated contaminated soils, etc.). In addition, research has indicated that PAH concentrations in the environment have increased during the last 100 years and sediment contamination is often linked to anthropogenic inputs occurring at the local and regional level. As a result, it is important to identify those streams that contain levels of PAH contaminants in sediments that may be too toxic for aquatic life. Approximately 18 to 22 sites are monitored annually. The total annual cost of this program is approximately \$45,000 using §319 NPS PPG funds.

- Wetland Monitoring Program

Wetlands provide key habitats for amphibians, fish, waterfowl, and aquatic invertebrates, while also providing essential ecosystem services for human uses. Reduction of floodplain connectivity, channelization and damming, wetland draining, and human development have dramatically reduced the amount of wetland habitat available in Missouri, leading to degraded conditions and loss of aquatic biodiversity. Remaining wetlands in the state vary in function and degree of human impact; however, designated standards for water quality and habitat conditions have not been set for Missouri wetlands.

EPA has instituted a national effort to encourage and support the development of state wetland programs and has identified four core elements (the Core Elements Framework) under the Enhancing State and Tribal Program (ESTP))⁵⁶ that comprise and strengthen effective state and tribal wetlands programs. One of these core elements is the development of scientifically defensible WQS for wetlands. Although Missouri's WQS define and address wetlands in general, Missouri currently does not have WQS for wetlands, including wetland-specific designated uses and criteria to protect those uses. A lack of water quality and other supporting data necessary to classify and identify wetland

⁵⁶ <https://www.epa.gov/wetlands/what-enhancing-state-and-tribal-programs-initiative>

uses currently precludes development of wetlands-specific WQS at this time. The goal of this project is to collect wetland-specific water quality data to aid in the establishment of WQS for wetlands in Missouri⁵⁷. Approximately 52 sites on 27 wetland areas are monitored annually. The annual cost of this program is approximately \$42,814 using Clean Water SRF Administrative Non-program Income.

Screening Level Monitoring – Citizen Volunteer Monitoring

The Volunteer Water Quality Monitoring (VWQM) Program began in 1993 and since that time, thousands of Stream Team volunteers have been trained to collect water quality samples from Missouri streams. The VWQM⁵⁸ Program provides a significant source of environmental screening level data. The VWQM Program is one of the most popular activities conducted by the Missouri Stream Team Program. The Missouri Stream Team Program is a partnership between the Department, MDC, Conservation Federation of Missouri, and the citizens of Missouri. Volunteer data is not only used to inform and educate Missouri citizens, establish baseline data on rarely sampled streams, locate emerging water quality problems and identify long-term trends in stream conditions, but it is also used as a screening tool to determine where more intensive follow-up monitoring is needed. Volunteer data is uploaded into the VWQM program database. Sites monitored by volunteer citizens can be viewed from the MDC Stream Team webpage⁵⁹. The estimated annual cost of this program is \$313,286 using \$319 NPS PPG funds.

In 2018, a stream data report⁶⁰ summarized and interpreted volunteer data collected between 1993 and 2016 (25 years of data) for each of the 13 aquatic ecological regions of the state. For each aquatic ecological region, the average of each of the physical parameters (pH, turbidity, conductivity and dissolved oxygen) and chemical indicators (nitrate, ammonia, phosphate, and chloride) are provided, along with the general biological conditions (poor, fair, good, excellent).

Probability-Based Surveys

The MDC Resource Assessment and Monitoring (RAM) Program performs aquatic macroinvertebrate, fish community, water quality, and habitat assessments at approximately 60 randomly selected stream sites annually (categorized as small to large rivers, stream orders 2-5). Each of Missouri's three ecological subregions are monitored on an ongoing, three-year rotation. Additionally, smaller watersheds identified as conservation priority geographies are intensively sampled (up to 30 sites per watershed) on a long-term rotation. The RAM Program may occasionally focus on sampling streams for several research projects outside of the random sampling rotation. The data generated through the RAM program is shared with the Department.

This monitoring program is a partnership between MDC and the Department that is formalized with a Memorandum of Understanding. The information is used by MDC for trend monitoring in priority watersheds and tracking species ranges. The Department uses these data for trend monitoring statewide and §305(b) reporting. The MDC also refers potentially impaired sites to

⁵⁷ <https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/standards>

⁵⁸ <https://dnr.mo.gov/water/get-involved/volunteer-water-quality-monitoring-program>

⁵⁹ <http://mostreamteam.org/interactive-map.html>

⁶⁰ <http://mstwc.org/wp-content/uploads/2013/05/Missouri-Stream-Team-Data-Summary-Report.pdf>

the Department for more intensive monitoring. Metrics for assessing the biological integrity of fish communities were developed for Ozark and Ozark Border streams in 2008 but was unsuccessful for Central Plains and Mississippi Alluvial Basin streams. MDC funds this program at an estimated annual cost of \$250,000. The §319 NPS program or grantees use the RAM data for watershed planning purposes and to better understand the overall health of a watershed.

Beginning in FY2016, the Department initiated a randomized chemical monitoring program in one to two priority watersheds. This monitoring involves a minimum of quarterly surface water samples from approximately 10-20 randomly chosen sites for approximately two to three years. These data are used to obtain baseline or background water quality data about the watershed. The estimated annual cost of this monitoring is \$35,000-\$60,000 using Clean Water SRF Administrative Non-program Income, §106, and §319 NPS PPG funds.

Water quality monitoring data collected by the Department and contributing partners will be uploaded into the Department's Water Quality Assessment (WQA) database. Contributing partner data is reviewed to ensure it meets the Department's criteria and is documented in a QAPP or a detailed water quality monitoring plan. Other data considerations are provided in the §303(d) LMD.

The list of §319 NPS projects collecting water quality data can change over time as projects are completed and new projects start. Therefore, the list of §319 NPS projects stated below may not be a complete list of project monitoring activities occurring within 2020-2025. Future project monitoring will be described in §319 NPS project plans and required QAPPs developed accordingly.

Objectives

- Require all 319 NPS projects collecting environmental data (e.g. water quality monitoring projects) to develop a QAPP following EPA's guidance for QAPP (EPA QA/G-5)⁶¹.
 - Develop QAPPs for all environmental data collection efforts.
- Continue to coordinate, prioritize and support (technically and financially) NPS monitoring efforts with the Department's WPS MAU and partnering agencies.
 - Long-Term Ambient Monitoring
 - State Outstanding Resource Waters
 - Five stream sites located within state parks
 - Coakley Hollow, Lake of the Ozarks State Park - HUC #1020109
 - Sugar Creek, Cuivre River State Park - HUC #07110008
 - East Drywood Creek, Prairie State Park - HUC #10290104
 - Ketchum Hollow, Roaring River State Park - HUC #11010001
 - Pickle Creek, Hawn State Park – HUC #07140105
 - Abandoned Coal Mine Lands

⁶¹ <https://www.epa.gov/quality/guidance-quality-assurance-project-plans-epa-qag-5>

- Seven streams, 22 sites
 - Big Otter Creek - HUC# 10290108
 - East Fork Tebo Creek - HUC# 10290108
 - Middle Fork Tebo Creek - HUC# 10290108
 - West Fork Tebo Creek - HUC# 10290108
 - Mill Creek - HUC# 10300101
 - Sugar Creek - HUC# 10280203
 - Cedar Creek - HUC#10300102
 - Water Quality Standards (Nutrients) and NPS TMDLs
 - 17 streams, 24 sites
 - Other Monitoring Needs
 - East Locust Creek - HUC#10280103
 - Lakes of Missouri
 - Statewide Lake Assessment Program (75 lakes: 40 primary lakes and 35 secondary lakes)
 - Lakes of Missouri Volunteer Monitoring Program (63 lakes, 115 sites)
- Watershed Plan or Baseline Monitoring.
 - Continue follow-up impaired waters monitoring in the Perry County Karst Area – HUC #07140105 using §106 grant funds (5 stream sites).
 - Continue data gap and baseline monitoring in Niangua - HUC #10290110: monitoring.
 - Continue data gap and baseline monitoring in Sac – HUC #10290106: Funded with SRF non-administrative funds, 10 stream sites.
 - Continue follow-up impaired waters monitoring in Shoal Creek – HUC #10290106 using §106 grant funds (six stream sites).
 - Schedule monitoring in Fishpot Creek – HUC #07140102 data gap and baseline monitoring volunteer citizen monitoring.
 - Schedule monitoring in Matesse Creek – HUC #07140102 data gap and baseline monitoring volunteer citizen monitoring.
- Watershed Project Effectiveness Monitoring
 - Schedule monitoring for North Fork Spring River - HUC #07140104: follow-up effectiveness monitoring, six stream sites.
 - Continue monitoring on Black Creek - HUC # 07110005: follow-up effectiveness monitoring, one stream site.
 - Continue monitoring on Wilsons Creek – HUC #11010002: data gap and baseline monitoring, one stream site.
- 319 NPS Project Monitoring.
 - Edge of Field Monitoring – Corn Growers (Regional) – Project approved QAPP
 - Wilsons Creek - HUC #11010002 – Project approved QAPP
 - South Creek – HUC #11010002 – Project approved QAPP
 - Greater Bonne Femme - HUC #10300102 – Project approved QAPP

- Coordinate with NRCS and the WPP MAU to develop a sampling regime for current and upcoming NWQI projects.
 - Continue monitoring of Lamar Lake HUC #11070207.
 - Develop monitoring plan for the ‘readiness phase’ projects.
- Continue to support the VWQM training program.
 - VWQM training programs (introductory, Level 1, Level 2, and Level 3) (Also reported under Goal 5, Objective 5.2.a-e of Table 14).
 - Cooperative Stream Investigation (CSI) sampling.
- Continue to support sediment monitoring.
 - The evaluation of approximately 18-22 sites annually of known or suspected sediment contamination or check sediment chemistry of water bodies suspected of having sediment contamination.
- Continue to support §319 NPS project monitoring data and the development of QAPPs.
 - Import §319 NPS project water quality data meeting appropriate data quality criteria into the WQA database.
 - Import partner water quality data meeting appropriate data quality criteria into the Department’s WQA database to be uploaded into EPA’s Water Quality Exchange (WQX)⁶².
- Track watershed implementation efforts to abate NPS pollution and where water quality improvements have been documented.
 - Prioritize follow-up monitoring in watersheds where NPS restoration activities have occurred. Compare follow-up monitoring data to baseline information.
 - Biennially review the §305(b) report for waters that have been delisted those that do not meet water quality criteria and designated uses due to NPS restoration activities.

⁶² <https://www.epa.gov/waterdata/water-quality-data-wqx>



Photo 5. Volunteer Water Quality Monitoring Workshop Photos

Goal 3 – Prioritization and Planning

Prioritize restoration of impaired waters for planning and implementation, and protect sensitive, vulnerable and high quality waters of the state so they may continue to meet their designated uses.

Background

Prior to federal fiscal year 2014, the Missouri §319 NPS Program focused more on restoration of impaired waters and less on protection of sensitive, vulnerable and high-quality waters. Current Missouri §319 NPS Program efforts will continue to provide funding to restore impaired waters, but will also provide funding opportunities to protect Missouri’s high-quality resources [e.g. water quality assessment category 1 waters, state and national outstanding resource waters, areas classified as sensitive areas (groundwater/karst areas and waters harboring endangered species), and wetlands] and source water.

Figure 8 provides a map of the Missouri §319 NPS Program priority watersheds and impaired waters. The §303(d) impaired rivers, streams, and lakes (assessment category 5) are based upon the 2018 EPA approved §303(d) impaired waters list. Additional information about the §303(d) impaired waters list can be found on the Department’s website:

<https://dnr.mo.gov/env/wpp/waterquality/303d/303d.htm>. Impaired water bodies with an EPA approved TMDL (assessment category 4a) are also listed in Figure 8. Information about EPA approved TMDLs can be found on the Department’s website:

<https://dnr.mo.gov/env/wpp/tmdl/wpc-tmdl-epa-appr.htm>.

Tables 7 and 8 provide a description of water bodies within each priority HUC-8 watershed for planning (Table 7) and restoration of impaired waters with EPA-approved 9-element WBPs (Table 8). Watershed planning requires the development of 9-element WBPs to address the water quality impairments or concerns, while restoration efforts focus on implementing those plans. The priority HUC-8 watersheds were ranked through a scoring process, based on several factors that include, but are not limited to, the need for preservation, restoration, nutrient reduction, and source water protection. The Department reserves the right to modify the list of priority HUC-8 watersheds to allow for planning and restoration activities in other watersheds when opportunities arise (e.g., citizen interest, new initiatives, or shifting priorities).

Tables 9 through 12 provide an overview of the priority water bodies and watersheds for NPS protection activities. Similar to the development of a 9-element WBPs to restore impaired waters, a 9-element watershed-based protection plan focuses on the protection and the prevention of future degradation of high-quality waters or sensitive areas.

Goal 3 focuses on prioritizing watersheds for the development of WBPs and alternative plans, while goal 4 focuses on the implementation of those plans once they are accepted by the state and EPA. Watershed plans shall fully address the nine-key elements of a WBP. The Department and EPA will review plans using the watershed-based planning checklist provided in Appendix 8. Emphasis will be placed on clearly documenting the water quality impairments and concerns, documenting pollutant loads, calculating pollutant load reductions needed to achieve the goals set for the waterbody, and identifying and ranking critical areas for the implementation of

practices. The management practices suggested in the plan, shall address the water quality impairment and other water quality concerns. Reference Appendix 12 for a list practices.

Several partnering organizations complete various types of assessments ranging from assessing water quality data against narrative or numeric criteria, assessing the overall health of a watershed or aquatic community, or assessing the effectiveness of land management practices. All of these types of assessment are essential for watershed prioritization and planning. It allows partners and the public to gain an understanding of where assessment data are available and where priorities and NPS activities overlap.

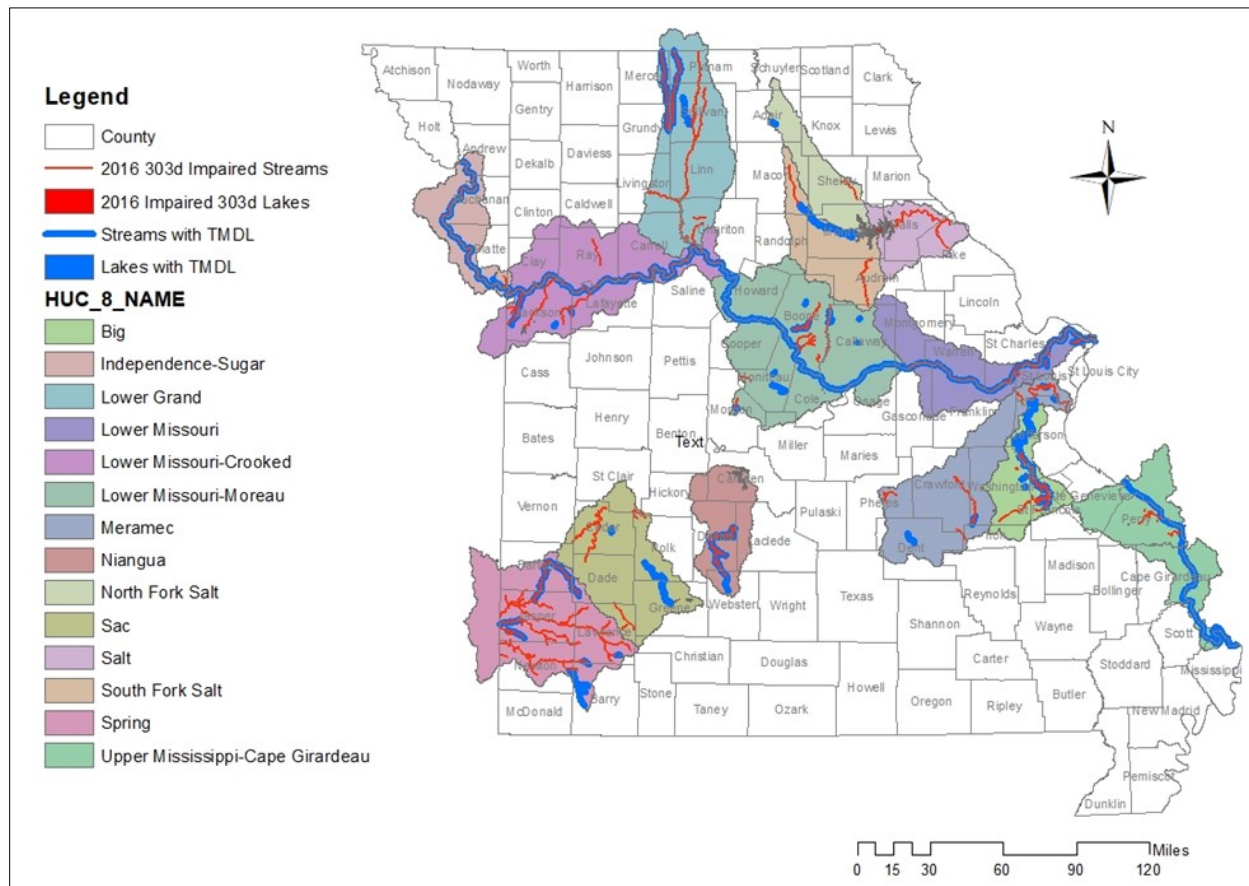


Figure 8. Map of priority watersheds and impaired waters.

Table 7. Priority watersheds for watershed planning.

Watershed Name	HUC-8	Impaired Water Bodies (Water Body ID#/Pollutant)	
		Category 4a (TMDL)	Category 5 (303(d))*
Lower Grand	10280103	East Fork Medicine Creek (0619/Sediment) Little Medicine Creek (0623/Sediment/bacteria) West Fork Locust Creek (0613/Unknown)	East Fork Locust Creek (0608 <i>E. coli</i> & 0610/ <i>E. coli</i> , Low Dissolved Oxygen) Grand River (0593/ <i>E. coli</i>) Medicine Creek (0619/ <i>E. coli</i>) Little Medicine Creek (0623 <i>E. coli</i>) Locust Creek (0606/ <i>E. coli</i>) Salt Creek (0594/Low Dissolved Oxygen)
Independence-Sugar	10240011	Missouri River (0226, 0356, 0701, 1604/Chlordane)	Line Creek (3575/ <i>E. coli</i>) Missouri River (0226/ <i>E. coli</i>) Weatherby Lake (7071/Nutrients)
Meramec (Upper)	07140102	Spring Creek (1870/Low Dissolved Oxygen, Sediment)	Burgher Branch (1865/Low Dissolved Oxygen) Dutro Carter Creek (3570/ <i>E. coli</i>) Little Dry Fork (1864/Low Dissolved Oxygen)
Upper Mississippi-Cape Girardeau	07140105	Mississippi River (0001, 1707, 3152/Chlordane, PCBs)	Brazeau Creek (1796/Low Dissolved Oxygen) Cinque Hommes Creek (1781/ <i>E. coli</i>) Dry Fork (1792/ <i>E. coli</i>) McClanahan Creek (1786/ <i>E. coli</i>) Omete Creek (1794/ <i>E. coli</i>)
Lower Missouri - Crooked	10300101	Blue River (0417, 0418, 0419, 0420/Chlordane)	Blue River (0417, 0418, 0419/ <i>E. coli</i>) Brush Creek (3986/PAHs, <i>E. coli</i> , Low Dissolved Oxygen) Bur Oak Creek (3414/ <i>E. coli</i>) East Fork Crooked River (0372/Low Dissolved Oxygen)East Fork Little Blue River (0428/ <i>E. coli</i>) Horseshoe Creek (3413/Low Dissolved Oxygen) Indian Creek (0420/Chloride) Little Blue River (0422/ <i>E. coli</i>) Little Blue River Trib (4107/ <i>E. coli</i>) Mill Creek (4066/ <i>E. coli</i>) Missouri River (0356/ <i>E. coli</i>) Sni-a-bar Creek (0361/Low Dissolved Oxygen) Spring Branch (5004/ <i>E. coli</i>)

Watershed Name	HUC-8	Impaired Water Bodies (Water Body ID#/Pollutant)	
		Category 4a (TMDL)	Category 5 (303(d))*
Lower Missouri - Moreau	10300102	Hinkson Creek (1007 & 1008/Stormwater Runoff, Unknown) Kelly Branch (1016/Sediment) Rocky Fork (1014/Sediment)	Bass Creek (0752/ <i>E. coli</i>) Bonne Femme (0750 & 0753/ <i>E. coli</i>) Cedar Creek (0737/Aquatic Macroinvertebrates) Clark Fork (1000/Low Dissolved Oxygen) Fowler Creek (0747/Low Dissolved Oxygen) Gans Creek (1004/ <i>E. coli</i>) Grindstone Creek (1009/ <i>E. coli</i>) Hinkson Creek (1007 & 1008/ <i>E. coli</i>) Hominy Branch (1011/ <i>E. coli</i>) Little Bonne Femme (1003/ <i>E. coli</i>) Petite Saline Creek (0785/Low Dissolved Oxygen) Willow Fork and Trib to Willow Fork (0955 & 0956/Low Dissolved Oxygen) Turkey Creek (0751/ <i>E. coli</i>)
Lower Missouri	10300200	Coldwater Creek (1706/Bacteria) Creve Coeur Creek (1703/Bacteria)	Bonhomme Creek (1701/ <i>E. coli</i> , pH) Coldwater Creek (1706/Chloride, <i>E. coli</i>) Creve Coeur Creek (1703/Chloride, <i>E. coli</i> ,) Fee Fee Creek (new) (1704/Chloride, <i>E. coli</i>) Wildhorse Creek (1700/ <i>E. coli</i>)
Niangua	10290110	Dousinbury Creek (1180/Bacteria) Niangua River (1170/Bacteria) West Fork Niangua River (1175/Low Dissolved Oxygen)	Little Niangua (1189/Low Dissolved Oxygen)
Sac	10290106	McDaniel Lake (7236/Algae) Little Sac River (1381/Bacteria)	Cedar Creek (1344 & 1357/Aquatic Macroinvertebrates, <i>E. coli</i> , Low Dissolved Oxygen) Horse Creek (1348/Aquatic Macroinvertebrates, Low Dissolved Oxygen) Panther Creek (1373/Low Dissolved Oxygen) Sadler Branch (3577/Low Dissolved Oxygen) Trib. to Goose Creek (1420/ <i>E. coli</i>) Turnback Creek (1414/ <i>E. coli</i>)

Watershed Name	HUC-8	Impaired Water Bodies (Water Body ID#/Pollutant)	
		Category 4a (TMDL)	Category 5 (303(d))*
North Fork Salt	07110005	Bear Creek (0115U-01/Unknown) Black Creek (0111/Bacteria)	Note: Black Creek WBP is in the same 8-digit HUC
South Fork Salt	07110006	Middle Fork Salt (0121/Sediment)	South Fork Salt River (0142/Low Dissolved Oxygen) Trib. to Coon Creek (0133/Low Dissolved Oxygen)

*Based upon the 2018 EPA approved 303(d) list of impaired waters.

Table 8. Priority watersheds for the implementation of EPA-accepted watershed-based plans

Watershed Name	HUC Name	HUC-8	Priority HUC 12	Water Quality Impairments and Concerns
Black Creek	North Fork Salt	07110005	Black Creek: 071100050202	<i>E. coli</i> , Nutrients, Low Dissolved Oxygen
Deer Creek	Cahokia-Joachim	07140101	Deer Creek: 071401010504	<i>E. coli</i> , Chloride
Spring River	Spring	11070207	North Fork Spring: 110702070201 110702070202 110702070203 110702070206 110702070302 110702070306 110702070307 110702070311 110702070506 White Oak Creek: 110702070502 Honey Creek: 110702070102 110702070103 Spring River: 110702070101 110702070104 110702070105 110702070107 110702070503 110702070504 110702070505 110702070508	<i>E. coli</i> , Nutrients, Sediment

Watershed Name	HUC Name	HUC-8	Priority HUC 12	Water Quality Impairments and Concerns
			Center Creek: 110702070602 110702070605 Clear Creek: 110702070704 110702070705 Shoal Creek: 110702070701 110702070702 110702070706 110702070801 110702070803 110702070804 110702070805 110702070806 110702070901	
Wilsons Creek (Middle James River)	James	11010002	Headwaters of Wilsons Creek: 110100020301 Wilsons Creek: 110100020303	Nutrients (Implementing the James River Nutrient TMDL)
Lower Meramec	Meramec	07140102	Hamilton Creek: 071401021001 Keifer Creek subwatershed	<i>E. coli</i> , Chloride

Note: other watersheds will be added to the priority list once the WBPs have been developed and accepted by EPA.

Category 1 water bodies (Table 9) have water quality assessment data (physical and chemical) and other information, which indicates all designated uses are fully maintained and are not “threatened” or trending toward impairment.

Table 9. Category 1 Waters (based upon 2018 303(d) Listing Cycle).

Listing Cycle Year	HUC-8	Waterbody Name	Waterbody ID #	Waterbody Class	Size (miles)	Category Code
2018	07140102	Huzzah Cr.*	1903	P	35.80	1
2018	11010008	L. Black R.	2620	P	30.20	1
2018	11010007	Black R.	2732	P	26.90	1
2018	11070208	Elk R.	3246	P	23.20	1

Note: Waterbody Class P streams maintain permanent flow even in drought conditions.

** Water bodies located within priority HUC-8 watersheds*

Table 10 provides a list of the state outstanding resource waters. These waters are classified as high-quality waters with significant aesthetic, recreational, or scientific value by the Clean Water Commission.

Table 10. State Outstanding Resource Waters.

Water Body Name	Water Body ID	Length/Area	Miles/ Acres	Location	County(ies)	HUC-8
Baker Branch	10004	4.0	mi.	Taberville Prairie	St. Clair	10290105
Bass Creek	10005	1.0	mi.	Three Creek Conservation Area	Boone	10300102
Big Buffalo Creek	10006	1.5	mi.	Big Buffalo Creek Conservation Area	Benton-Morgan	10290109
Big Creek	10007	5.3	mi.	Sam A. Baker State Park	Wayne	08020202
Big Lake Marsh	10009	150.0	ac.	Big Lake State Park	Holt	10240005
Big Sugar Creek	10008	7.0	mi.	Cuivre River State Park	Lincoln	07110008
Blue Springs Creek	10010	4.0	mi.	Blue Spring Creek Conservation Area	Crawford	07140102
Bonne Femme Creek	10011	2.0	mi.	Three Creeks Conservation Area	Boone	10300102
Brush Creek	10012	0.7	mi.	Bonanza Conservation Area	Caldwell	10280101
Bryant Creek	10013	1.5	mi.	Bryant Creek Natural Area in Rippee Conservation Area	Ozark-Douglas	11010006
Bull Creek	10014	8.0	mi.	Mark Twain National Forest Sec. 24,25N,21W to Sec. 22,26N,20W	Christian	11010003
Cathedral Cave Branch	10015	5.0	mi.	Onondaga Cave State Park	Crawford	07140102
Chariton River	10016	9.8	mi.	Rebels Cove Conservation Area	Putnam-Schuyler	10280201
Chloe Lowry Marsh	10017	40.0	ac.	Chloe Lowry Marsh Conservation Area	Mercer	10280102
Coakley Hollow	10018	1.5	mi.	Lake of the Ozarks State Park	Camden	10290109
Coonville Creek	10019	2.0	mi.	St. Francois State Park	St. Francois	07140104
Courtois Creek	10020	12.0	mi.	Mouth to Hwy. 8	Crawford	07140102
Crabapple Creek	10021	1.0	mi.	Bonanza Conservation Area	Caldwell	10280101
Devils Ice Box Cave Branch	10022	1.5	mi.	Rock Bridge State Park	Boone	10300102
East Fork Black River	10023	3.0	mi.	Johnson's Shut-Ins State Park	Reynolds	11010007
First Nicholson Creek - East Drywood Creek	10024	2.0	mi.	Prairie State Park	Barton	10290104
Gans Creek	10025	3.0	mi.	Rock Bridge State Park	Boone	10300102
Huzzah Creek	10026	6.0	mi.	Mouth to Hwy. 8	Crawford	07140102
Indian Creek	10027	17.5	mi.	Mark Twain National Forest	Douglas-Howell	11010006
Ketchum Hollow	10028	1.5	mi.	Roaring River State Park	Barry	11010011
Little Black River	10030	3.0	mi.	Mud Puppy Natural History Area S22,T24N,R3E to S25,T24N,R3E	Ripley	11010008
Little Piney Creek	10029	25.0	mi.	Mouth to 21,35N,08W	Phelps	10290203
Log Creek	10031	0.4	mi.	Bonanza Conservation Area	Caldwell	10280101
Meramec River	10032	8.0	mi.	Adjacent to Meramec State Park	Crawford-Franklin	07140102
Meramec River	10033	3.0	mi.	Adjacent to Onondaga and Huzzah State Forest	Crawford	07140102
Mill Creek	10034	5.0	mi.	Mark Twain National Forest	Phelps	10290203

Water Body Name	Water Body ID	Length/Area	Miles/ Acres	Location	County(ies)	HUC-8
N. Fork White River	10035	5.5	mi.	Mark Twain National Forest	Ozark	11010006
Noblett Creek	10036	5.0	mi.	Above Noblett Lake, Mark Twain National Forest	Douglas-Howell	11010006
Onondaga Cave Branch	10037	0.6	mi.	Onondaga Cave State Park	Crawford	07140102
Pickle Creek	10038	3.0	mi.	Hawn State Park	Ste. Genevieve	07140105
S. Prong L. Black River	10039	2.0	mi.	Little Black Conservation Area	Ripley	11010008
Shoal Creek	10040	0.5	mi.	Bonanza Conservation Area	Caldwell	10280101
Spring Creek	10042	6.5	mi.	Mark Twain National Forest	Phelps	10290202
Spring Creek	10041	17.0	mi.	Mark Twain National Forest	Douglas	11010006
Taum Sauk Creek	10043	5.5	mi.	Johnson's Shut-Ins State Park Addition S23,T33N,R2E to S5,T33N,R3E	Reynolds-Iron	11010007
Turkey Creek	10044	4.6	mi.	Three Creeks Conservation Area	Boone	10300102
Van Meter Marsh	10045	80.0	ac.	Van Meter State Park	Saline	10300101
Whetstone Creek	10045	5.1	mi.	Whetstone Creek Conservation Area	Callaway	10300200

Table 11 provides a list of water bodies that have outstanding national recreational and ecological significance. These waters shall receive special protection against any degradation in quality. Congressionally designated rivers, including those in the Ozark National Scenic Riverways and the Wild and Scenic Rivers system, are included in this list.

Table 11. Outstanding National Resource Waters

Water Body	Water Body ID	Location	County(ies)	Legal Description			HUC-8
Current River	10001	Northern Ripley Co. Line to Headwaters	Ripley to Dent	15,25N,1E	to	22,32N,7W	11010008
Eleven Point River	10003	Hwy. 142 to Headwaters	Oregon	21,22N,2W	to	32,25N,5W	11010011
Jacks Fork River	10002	Mouth to Headwaters	Shannon to Texas	Mouth	to	29,28N,7W	11010008

Table 12 provides a list of natural and constructed wetlands located on public properties that could be considered for protection and restoration. Table 12 also lists wetlands designated as a state outstanding resource water.

Table 12. Wetlands located on public lands.

WATER BODY ID#	WETLAND NAME	PUBLIC LANDS LOCATION (Managing Entity)
N/A	Bee Hollow	Bee Hollow Conservation Area (MDC)
7367	Big Buffalo Conservation Area Lakes*	Big Buffalo Creek Conservation Area (MDC) Includes Big Buffalo Creek Fen Natural Area
10009	Big Lake Marsh*	Big Lake State Park (DNR)
10017	Chloe Lowry Marsh*	Chloe Lowry Marsh Conservation Area (MDC)
7090	Cooley Lake	Cooley Lake Conservation Area (MDC)
7339	Duck Creek	Duck Creek Conservation Area (MDC) Next to Mingo National Wildlife Refuge (USFWS)
7147	Fountain Grove Lakes	Fountain Grove Conservation Area (MDC)
N/A	Busch Memorial Wetlands	Four Rivers Conservation Area (MDC)
N/A	Little Bean Marsh	Little Bean Marsh Conservation Area (MDC)
7005	Marais Temps Clair	Marais Temps Clair Conservation Area (MDC)
N/A	Marion Bottoms	Marion Bottoms Conservation Area (MDC)
7340	Monopoly Lake	Mingo National Wildlife Refuge (FWS)
7006	Willow Wood Lake	Next to Marais Temps Clair Conservation Area (MDC)
7337	Otter Lake	Otter Slough Conservation Area (MDC)
7142	Pershing St. Park Lakes	Pershing State Park (MoDNR)
7447	Settles Ford Conservation Area Lakes	Settle's Ford Conservation Area (MDC)
7060	Squaw Creek National Wildlife Refuge Pools	Squaw Creek National Wildlife Refuge (USFWS) Next to McCormack Conservation Area (MDC) and McCormack Loess Mounds Na Fee (TNC)
7139	South Pool-Levee 3	Swan Lake National Wildlife Refuge (USFWS) Next to Yellow Creek Conservation Area (MDC)
7141	Swan Lake Levee 5	Swan Lake National Wildlife Refuge (USFWS) Next to Yellow Creek Conservation Area (MDC)
10045	Van Meter Marsh*	Van Meter State Park (MoDNR)

**Also classified as a State Outstanding Resource Water*

MDC=Missouri Department of Conservation; USFWS=U.S. Fish and Wildlife Service; MoDNR=Missouri Department of Natural Resources; TNC=The Nature Conservancy

Objectives

- Continue to provide technical and financial support and coordination with the TMDL unit.
 - Direct watershed planning efforts within the priority watersheds where TMDLs and implementation plans have been or may serve as alternatives to TMDLs (5-alt) (reference Table 7).
- Continue to provide technical and financial support for NPS planning and restoration activities.
 - Encourage the development of restoration plans for water bodies listed as impaired under assessment categories 5 and 4a. (Table 7).
 - Track impairments in current and future §303(d) listing cycles (§305(b) report).
 - Track proposed impairments for lakes with ecoregional nutrient criteria (criteria approved by EPA in 2018, but assessment results will be reported in the 2020 §305(b) report).
- Continue to provide technical and financial support for NPS protection activities.
 - Encourage protection planning activities in priority watersheds containing waters bodies assessed as Category 1 waters listed in Table 9 and subsequent §305(b) reports.
 - Develop priorities for WBPs and implementation in watersheds that impact Outstanding State and National Resource Waters important for aquatic life (Table 10 and 11).
- Continue to provide technical and financial support for SWP activities.
 - Work with the Department's SWP, watershed groups, and other eligible entities to identify and prioritize wells (drinking water and exploratory mine wells) in need of proper decommissioning in vulnerable or sensitive areas.
- Continue to provide technical and financial support for wetland activities.
 - Work with the WPP, WRC, State Parks, and MDC and other entities to develop criteria for wetland protection and prioritize wetlands for protection and restoration planning activities (Table 12).
 - Work with the WPP, WRC, State Parks, and MDC and other entities to prioritize wetlands for protection and restoration planning activities (Table 12).
- Other studies.
 - Work in priority areas where the Department has partnered with USACE on feasibility studies to address large scale water quality issues in watersheds identified in the studies (e.g. Lower Grand, Meramec/Big River).
 - Work with the MDC to determine where MDC Conservation Opportunity areas overlap with §319 NPS project planning and implementation priorities.

- Develop list of points of contacts for each partnering organization.
 - Send email to partnering organizations to determine main points of contact per subject item (e.g. organizations priorities, planning, water quality monitoring, implementation, outreach, etc.).
 - Check on the feasibility of the Department to create a data warehouse or share point site to allow partners and stakeholders to share information.



Photo 6. A Missouri wetland

Goal 4 - Implementation of Restoration and Protection Projects

Improve and protect the water quality of Missouri's surface waters and groundwater by reducing NPS pollutants such as nutrients, sediments, and bacteria; restoring aquatic habitats; and re-establishing flow regimes that mimic natural conditions.

Background

The goal of MNPSMP is to protect and improve the quality of the state's water resources using locally led approaches to address NPS impairments. This will be done by encouraging eligible entities at the local level to seek §319 NPS grant funds to implement EPA-accepted WBPs to restore and protect water bodies. Annual requests for proposal (RFP) are announced and posted on the Department's website. The RFP provides a list of priorities, project details, and other requirements for responding to the request. Additional information is provided in Chapter 8 – NPS Program Administration, NPS Program Funding Allocation.

Objectives

- Continue to support NPS restoration projects.
 - Solicit proposals and fund §319 NPS eligible restoration strategies in critical areas identified in EPA-accepted 9-element WBP proposed by §319 grant NPS applicants whose implementation applications rank high for funding (Also reported under Goal 3, Objective 3.2 of Table 14).
- Continue to support NPS protection projects.
 - Solicit proposals and fund §319 NPS eligible protection strategies in critical areas identified in EPA-accepted 9-element WBPs proposed by §319 NPS grant applications whose implementation applications rank high for funding (also reported under Goal 3, Objective 3.3.a of Table 14).
- Continue to leverage SWCP Activities.
 - Continue to leverage conservation practice implementation activities of the SWCP in critical areas identified in EPA-accepted 9-element WBPs (also reported under Objective 1.1 of Table 14).
- Investigate opportunities to leverage or support other nonfederal NPS implementation or protection activities in critical areas identified in EPA-accepted 9-element WBPs.
 - MDC Forestry/Private Lands BMPs: stream bank stabilization; riparian buffer, sediment traps (not located in “waters of the state”); road and trail design; construction, maintenance, and closure conforming to standards; water bars; temporary bridges/culverts; seeding skid trails and other eroding areas; fords; diversions; log landings; and silt fences.
 - DNR LRP Abandoned Mine Land BMPs: erosion controls; grading; lime and other chemicals to treat acid mine drainage; revegetation; phytoremediation; soil amendments; soil removal/disposal; drainage controls; well abandonment; ground water remediation; mine share and adit (horizontal tunnel) closings; ditches to divert surface water from mine waste, tailings, or mine works; removal and consolidation of small waste piles; removal of large waste piles from water sources; relocation of stream from waste rock dump or tailings pile; capping

waste rock piles or tailings with uncontaminated soils followed by revegetation; aeration and settling ponds to promote precipitation of metals from mine drainage; sulfate-reducing wetlands; oxidation wetlands; passive acid mine drainage treatment facilities; active acid mine drainage treatment facilities; as well as agricultural management practices to improve soil structure and fertility while reducing erosion.

- Aquatic habitat restoration: low head dam removal/fish passage barriers; stream bank stabilization; wetland restoration/creation; National Fish Habitat Program; dredging lakes; natural channel/two-stage ditch/self-forming channel and other restoration designs; and levee or dike modification/removal.
- Explore the opportunities to work with state and county health departments.
 - Determine Feasibility of the development of a statewide or regional onsite wastewater pump out and replacement program.
- Explore opportunities to streamline the process for tracking WBPs.
 - Work with EPA to explore opportunities for the watershed tracker in EPA's GRTS database to assist with tracking, and reporting pollutant load reductions for each WBP.



Photo 7. St. Louis Great Streets Rain Gardens

Goal 5 - Public Engagement

Develop and implement a strategic outreach and engagement program.

Background

Raising public awareness regarding NPS is an important issue that should be addressed by water quality agencies and partnering organizations. The Missouri §319 NPS Program will continue efforts to provide information through various types of media. The Missouri §319 NPS Program website will be updated and promoted to target audiences such as NPS grantees and partners. The Missouri §319 NPS Program will continue to work with its partners to train citizens on surface water quality through the Missouri Stream Team VWQM program and require §319 NPS projects to include an outreach program to educate local citizens about NPS and about their project efforts.

In addition, Missouri §319 NPS Program staff will engage interested groups and communities through direct contact, conference attendance, involvement in statewide and regional initiatives, and webinars and other training opportunities. Missouri §319 NPS Program handouts and other printed materials will be developed (e.g. factsheets and brochures) and made available to the public.

Objectives

- Continue to review and update written and electronic materials and promote the Missouri §319 NPS Program at various venues.
 - Annually review printed and electronic materials and update and republish as needed.
 - As needed review and update the §319 NPS webpages.
- Continue to support citizen monitoring training through the Missouri Stream Team and VWQM program⁶³ (also reported under Goal 2, Objective 2.4. of Table 14).
 - Introductory Workshop: annually during the spring.
 - Level 1 Workshop: annually during the fall.
 - Level 2 Workshop: annually during the winter.
 - Level 3 Evaluation: as requested.
 - Cooperative Stream Investigation (CSI): up to four times annually or as citizen interest or monitoring requests occur.

⁶³ <https://dnr.mo.gov/water/get-involved/volunteer-water-quality-monitoring-program>

- Highlight §319 NPSs program and project successes of the NPS program, including partner projects.
 - Annually produce at least one NPS success story (based upon Goal 2, Objective 2.7.b).
 - Publicize NPS successes on the Department’s §319 NPS website.
- Utilize a variety of methods to engage the public.
 - Social media (Twitter Facebook, etc.).
 - Public events (i.e., Earth Day, State Fair, and other events).
 - Promote the Missouri §319 NPS Program at various venues, highlighting program purpose, requirements, and types of eligible projects.
 - Meetings, conferences, and workshops (e.g., Water Protection Forum, Missouri Natural Resources Conference, FAC workshops, Water Quality Coordinating Committee).
- Partner NPS outreach efforts.
 - Explore opportunities to leverage partner outreach activities relating to NPS pollution issues and efforts to protect high quality streams and actions that can be taken to restore threatened and impaired waters (also reported under Goal 1, Objective in 1.6.a).
- §319 NPS Watershed Workshop.
 - Investigate possibilities to host §319 NPS watershed workshops
 - Form a workshop committee.

Measuring Success

The success of the watershed planning efforts will initially be measured by outputs such as the number of watershed planning documents developed, actions identified and prioritized, and actions implemented. Over time as more actions are implemented, the focus of performance measures will shift to outcomes such as reductions in NPS pollutant loads and delisting of water bodies impaired by NPS pollution. These successes will be reported annually in the Department’s required annual progress report to EPA and posted on their website: <https://www.epa.gov/nps/success-stories-about-restoring-water-bodies-impaired-nonpoint-source-pollution>. The ultimate goal is to report NPS successes where water quality improvements have been documented. Table 13 provides a list of Missouri’s NPS success story submitted to EPA.

Table 13. List of Missouri’s NPS success stories.

Water Body Name	Year	Water Body Name	Year
Upper Cedar Creek	2006	Monroe City Route J Lake	2012
Cameron, Mark Twain and Smithville Lakes	2007	Kelley Branch and Rocky Fork	2013
Vandalia Lake	2008	Higginsville South Lake	2014
Fellows Lake	2009	Drywood and Second Nicholson Creek	2017
North Fabius River	2010	East Fork Little Chariton River	2018
Dardenne Creek	2012	McCoy Creek	2019

Other measures may include:

- Prevention of new impairments – number of miles of high quality waters protected.
- Reduced beach closures.
- Track nutrient trends toward watershed-based targets in watersheds that overlap with the nutrient reduction strategy priority areas.
- Total number of practices installed within watersheds with Department- and EPA-accepted WBPs.
- Number of 9-element WBPs developed or address SWP areas.
- Number of new 9-element WBPs developed and accepted by the Department and EPA.
- Number of outreach venues attended that discuss the NPS program, and NPS impacts and prevention, etc.



Photo 8. Children exploring a Missouri stream

Table 14. Consolidated list of goals, objectives, measures, and outcomes.

Goal 1	Leveraging and Collaboration													
Utilize partnerships to leverage available resources for NPS management.														
Objective 1.1.	Leverage the implementation of SWCP conservation activities.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
1.1	a.	Leverage the implementation of SWCP conservation activities in watersheds with EPA accepted 9-element WBPs.	2020	2025	Ongoing/ Long-Term	319/SWCP	SWCP	#EPA-Accepted WBP	# Leveraged Areas/ Cost	x	x	x	x	x
1.1	b.	Upload eligible leverage projects into the EPA’s online GRTS (<i>also reported under Objective 4.3</i>).	2020	2025	Annually/ Long-Term	319	319	# Leveraged Areas	Load Reductions Reported	x	x	x	x	x
Objective 1.2	Partner with USDA-NRCS on the NWQI for as long as the initiative remains a national priority.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
1.2	a.	Continue to provide SWCP technical support and participate at State Technical Committee meetings and workgroups.	2020	2025	Annually/ Long-Term	319/WPS/ SWCP/NRCS	319/ SWCP	Attend Annual Meeting	N/A	x	x	x	x	x
1.2	b.	Continue to coordinate with NRCS and the Department’s WPS to schedule monitoring for NWQI projects.	2020	2025	Ongoing/ Long-Term	319/WPS/ NRCS	319/ NRCS	Sites Selected	QAPP	x	x	x	x	x
1.2	c.	Continue to coordinate with NRCS and the WPS MAU to develop a monitoring strategy for the two NRCS readiness phase projects.	2020	2025	Ongoing/ Long-Term	319/WPS/ NRCS	319/ NRCS	Sites Selected	# Monitoring Plans Completed	x	x	x	x	x
1.2	d.	Coordinate with NRCS on at least an annual basis to share in the decision-making on the next steps regarding the initiatives.	2020	2025	Ongoing/ Long-Term	319/WPS/ SWCP/NRCS	319, SWCP	Attend Annual Meeting	Priorities Determined	x	x	x	x	x
Objective 1.3	Support the implementation of the State Nutrient Loss Reduction Strategy.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
1.3	a.	Continue to provide technical support as needed at scheduled meetings.	2020	2025	Ongoing/ Long-Term	319/WPP	319	Attend Annual Meeting	N/A	x	x	x	x	x
1.3	b.	Continue to include nutrient reduction strategies into §319 NPS WBP efforts, where priority areas overlap.	2020	2025	Ongoing/ Long-Term	319/WPP	319	Annual RFP	# EPA-Accepted WBP	x	x	x	x	x
1.3	c.	Provide technical and financial support for the implementation of conservation practices that reduce nutrient inputs and related water quality impacts within the Missouri and Mississippi River basins.	2020	2025	Ongoing/ Long-Term	319/WPP	319/ Various	Annual RFP	# projects within Missouri and Mississippi HUCs	x	x	x	x	x

Objective 1.4	Provide technical support to the UMRBA.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
1.4	a.	Continue to attend Executive Committee and Water Quality Task Force meetings.	2020	2025	Quarterly/ Long-Term	DNR	319, 106, 604b	Attend 4 meetings	N/A	x	x	x	x	x
Objective 1.5	Seek other leveraging and collaboration opportunities to address NPS pollution.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
1.5	a.	Meet with the Department's FAC to seek collaboration opportunities through the SRF Program.	2020	2025	Ongoing/ Long-Term	319/FAC	319/FAC	Attend Annual Meeting	List of Potentially Shared Opportunities	x	x	x	x	x
1.5	b.	Meet with the MDC to seek collaboration and leveraging opportunities in priority watersheds.	2020	2025	Ongoing/ Long-Term	319/MDC	319/ MDC	Attend Annual Meeting	List of Potentially Shared Opportunities	x	x	x	x	x
1.5	c.	Continue to provide technical support and seek collaboration opportunities through the Missouri's wetland program and plan updates ⁶⁴ .	2020	2025	Ongoing/ Long-Term	319/WPP	319	Attend Annual Meeting	List of Potentially Shared Opportunities	x	x	x	x	x
1.5	d.	Promote NPS projects in areas where USACE feasibility studies and restoration plans have been completed.	2020	2025	Ongoing/ Long-Term	319/DEQ	319/ Partners	Attend Annual Meeting	List of Potentially Shared Opportunities	x	x	x	x	x
Objective 1.6	Partners NPS outreach efforts.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
1.6	a.	Explore opportunities to leverage outreach regarding NPS pollution issues and efforts to protect high quality streams and actions that can be taken to restore threatened and impaired waters (<i>also reported under Goal 5, Objective in 5.5.a</i>).	2020	2025	Ongoing/ Long-Term	Partners	Partners	Annual Partners Meeting/ Survey	Venues Identified	x	x	x	x	x
Objective 1.7	Reestablish the Water Quality Coordinating Committee meetings.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
1.7	a.	Survey partners and stakeholders to determine the best times to hold coordinating meetings, frequency, and NPS discussion topics.	2020	2025	Ongoing/ Long-Term	319/Partners	319/ Partners	TBD Partners Meeting/ Survey	Meeting schedule and list of those interested in participating and hosting	x	x			
1.7	b.	Host meetings.	2020	2025	Ongoing/ Long-Term	319/Partners	319/ Partners	TBD	TBD			x	x	x

⁶⁴ <https://dnr.mo.gov/document-search/missouri-wetland-program-plan-2013-2018>

Goal 2	Monitoring and Assessment														
Monitor and assess Missouri waters for NPS impairments and improvements.															
Objective 2.1	Require all §319 NPS projects collecting environmental data (e.g. water quality monitoring projects) to develop a QAPP following EPA’s guidance for QAPP (EPA QA/G-5).			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
											20	21	22	23	24
2.1	a.	Develop QAPPs for all environmental data collection efforts.		2020	2025	Ongoing/ Long-Term	319/WPS	319 PPG/ 106 PPG/ 604b	Sites Selected	QAPP	x	x	x	x	x
Objective 2.2	Continue to coordinate, prioritize, and support (technically and financially) NPS monitoring efforts with the Department’s WPS MAU and partnering agencies.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
											20	21	22	23	24
2.2	a.	Long-Term Ambient Monitoring													
2.2	a.	i.	State Outstanding Resource Waters – 5 stream sites.	2020	2025	3 times/ Year/ Long-Term	319/WPS	319 PPG, State Parks	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
2.2	a.	ii.	Abandoned Coal Mine Lands – 7 streams, 22 sites.	2020	2025	2 times/ year Long-Term	319/WPS/LRP	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
2.2	a.	iii.	WQS (Nutrients) and NPS TMDLs – 17 streams, 24 sites.	2020	2025	Varied Long-Term	319/WPS	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
2.2	a.	iv.	Other Monitoring Needs – 1 stream, 1 site.	2020	2025	Varied Long-Term	319/WPS	319 PPG, 106 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
2.2	a.	vi.	Lakes of Missouri - 138 lakes, 190 sites.	2020	2025	Varied Long-Term	319/WPS/ University of Missouri	319 Projects	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
2.2	b.	Watershed Plan or Baseline Monitoring													
2.2	b.	i.	Continue monitoring in the Perry County Karst Area – HUC #07140105: follow-up impaired waters monitoring. 5 stream sites.	2020	2021	5 times/ year Short-Term	319/WPS	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x			

2.2	b.	ii.	Continue monitoring Niangua - HUC #10290110: data gap and baseline monitoring, 10 sites.	2020	2021	3 times/ year Short-Term	319/WPS	106 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x			
2.2	b.	iii.	Continue monitoring in Sac – HUC #10290106: data gap and baseline monitoring. Funded with SRF non-admin funds, 10 stream sites.	2020	2021	6 times /year Short-Term	319/WPS	non-admin. SRF	Monitoring Completed and in WQA Database	Raw Data	x	x			
2.2	b.	iv.	Continue monitoring in Shoal Creek – HUC #10290106: follow-up impaired waters monitoring. Funded with §106 grant, 6 stream sites.	2020	2021	8 times/ year Short-Term	319/WPS	106 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x			
2.2	b.	v.	Schedule monitoring in Fishpot Creek – HUC #07140102 data gap and baseline monitoring.	2020	2022	TBD Short-Term	319/WPS/CSI	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x				
2.2	b.	vi.	Schedule monitoring in Mattese Creek – HUC #07140102 data gap and baseline monitoring.	2020	2021	TBD Short-Term	319/WPS/CSI	319 PPG/ CSI	Monitoring Completed and in WQA Database	Raw Data	x				
2.2	c.	Watershed Project Effectiveness Monitoring													
2.2	c.	i.	Schedule monitoring for North Fork Spring River - HUC #07140104: follow-up effectiveness monitoring, 6 stream sites.	2025	2025	Once every 6 years Short-Term	319/WPS	319 PPG/ 604b	Monitoring Completed and in WQA Database	Raw Data					x
2.2	c.	ii.	Continue monitoring on Black Creek - HUC # 07110005: follow-up effectiveness monitoring, 1 stream site.	2020	2025	5 times/ year Short-Term	319/WPS	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
2.2	c.	iii.	Continue monitoring on Wilsons Creek – HUC #11010002: data gap and baseline monitoring, 1 stream site.	2020	TBD	Monthly/ Short-Term	319/USGS	319 Project	Monitoring Completed and in WQA Database	Raw Data	x	x	x		
2.2	d.	319 NPS Project Monitoring (Approved QAPPs)													
2.2	d.	i.	Edge of Field Monitoring – Corn Growers (regional).	2018	2025	20 samples/ year Short-Term	319/Mo Corn Growers	319 Project	Monitoring Completed and in	Raw Data	x	x	x		

									WQA Database						
2.2	d.	ii.	Wilsons Creek - HUC #11010002.	2018	2020	Monthly Short-Term	319/James River Partnership	319 Project	Monitoring Completed and in WQA Database	Raw Data	x	x			
2.2	d.	iii	South Creek – HUC #11010002.	2019	2020	10 times/ year Short-Term	319/James River Partnership	319 Project	Monitoring Completed and in WQA Database	Raw Data	x	x			
2.2	d.	iv.	Greater Bonne Femme - HUC #10300102 – Bonne Femme and Little Bonne Femme.	2018	2020	4 times/ quarter Short-Term	319/Boone County	319 Project	Monitoring Completed and in WQA Database	Raw Data	x	x			
Objective 2.3	Coordinate with NRCS and the Department’s WPS MAU to develop a sampling regime for current and upcoming NWQI projects.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
2.3	a.	Continue monitoring of Lamar Lake HUC #11070207, 2 lake sites.		2020	2025	Monthly through summer Short-Term	319/WPS/ NRCS/ University of Missouri	319 Project	Monitoring Completed and in WQA Database	Raw Data	20x	21x	22x	23x	24x
2.3	b.	Develop monitoring plan for the ‘readiness phase’ projects.		2021	2022	On-going/ Long-Term	319/WPS/ NRCS	319 PPG	Monitoring Sites Selected	Raw Data	x	x	x	x	x
Objective 2.4	Continue to support citizen VWQM.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
2.4	a.	VWQM training programs (introductory, Level 1, Level 2, and Level 3) (Also reported under Goal 5, Objective 5.2.a-e).		2020	2025	Annually/ Long-Term	319/WPS/ MDC	319 PPG	Training Completed	# Sites Monitored/ # Data Submissions	x	x	x	x	x
2.4	b.	Cooperative Stream Investigation (CSI) sampling.		2020	2025	Annually/ Long-Term	319/WPS/ESP	319 PPG	# of projects	Raw Data	x	x	x	x	x
Objective 2.5	Continue to support sediment monitoring.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
2.5	a.	Evaluation of approximately 18-22 sites of known or suspected sediment contamination, or to check sediment chemistry of water not known or suspected of having sediment contamination.		2020	2025	Annually/ Short-Term	319/WPS	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
Objective						Frequency			Measure	Product/ Outcome	Reporting Year				

2.6	Continue to support 319 project monitoring data and the development of QAPPs.		FY Start	FY End		Responsible Party/Partner	Funding Source			20	21	22	23	24
2.6	a.	Continue to import 319 subgrantee water quality data meeting appropriate data quality criteria into the Department's WQA database.	2020	2025	Ongoing/ Long-Term	WPS	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
2.6	b.	Continue to import partner water quality data meeting appropriate data quality criteria into the Department's WQA database to be uploaded into WQX.	2020	2025	biennially to WQA quarterly to WQX Long-Term	WPS	319 PPG	Monitoring Completed and in WQA Database	Raw Data	x	x	x	x	x
Objective 2.7	Track watershed implementation efforts to abate NPS pollution and where water quality improvements have been documented.		FY Start	FY End	Frequency	Responsible Party	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
2.7	a.	Prioritize follow-up monitoring in watersheds where NPS restoration activities have occurred. Data will be compared back to baseline information.	2020	2025	2 times/year Long-Term	319/WPS	319 PPG	Annual Meeting	List	x	x	x	x	x
2.7	b.	Biennially review the §305(b) report for waters delisted and not meeting water quality criteria and designated uses due to NPS restoration activities.	2020	2025	Biennially Long-Term	319/WPS	319 PPG	Biennial Review	Success Story	x		x		x

Goal 3	Prioritization and Planning														
Prioritize restoration of impaired waters for planning and implementation, and protection of sensitive, vulnerable, and high quality waters of the state so that they may continue to meet their designated uses.															
Objective 3.1	Continue to provide technical and financial support and coordination with the TMDL unit.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
											20	21	22	23	24
3.1	a.	Direct 9-element watershed planning efforts within the priority watersheds where TMDLs and implementation plans have been or may serve as alternatives to TMDLs (Table 7).		2020	2025	Annually/ Long-Term	319/WPS	319 Project	Review Biennially with 303(d) List	List Developed/ Updated	x		x		x
Objective 3.2	Continue to provide technical and financial support for NPS planning and restoration activities.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
											20	21	22	23	24
3.2	a.	Encourage the development of 9-element WBPs for water bodies listed as impaired under assessment categories 5 and 4a.		2020	2025	Annually/ Long-Term	319/ Partners	319 PPG & Project/ Partners	Annual Meeting	List	x	x	x	x	x
3.2	a.	i.	Track impairments in current and future 303(d) listing cycles. (§305(b) report).	2020	2025	biennially	319/WPS	319 PPG	Biennial Review	303(d) Impaired Waters List	x		x		x
3.2	a.	ii.	Track proposed impairments for Lake with ecoregional nutrient criteria approved by EPA in 2018. (§305(b) report).	2020	2025	biennially	319/WPS	319 PPG	Biennial Review	303(d) Impaired Waters List	x		x		x
Objective 3.3	Continue to provide technical and financial support for NPS protection activities.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
											20	21	22	23	24
3.3	a.	Encourage protection activities in priority watersheds containing waters bodies assessed as Category 1 waters listed in Table 9 and subsequent §305(b) reports.		2020	2025	Annually/ Long-Term	319/WPS/ Partners	319 PPG & Project/ Partners	Biennial Review	List Developed/ Updated	x	x	x	x	x
3.3	b.	Develop priorities for WBPs and implementation in watersheds that impact Outstanding State and National Resource Waters important for aquatic life (Table 10 and 11).		2020	2025	Annually/ Long-Term	319/Partners	319 PPG & Project/ Partners	Develop List	List Developed/ Updated	x	x	x	x	x
Objective 3.5	Continue to provide technical and financial support for SWP activities.			FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
											20	21	22	23	24
3.5	a.	Work with the Department’s SWP, watershed groups, and other eligible entities to identify and prioritize wells (drinking water and exploratory mine wells) in need of proper decommission in vulnerable or sensitive areas.		2020	2025	Annually/ Long-Term	319/ SWPP	319 PPG & Project/ SWPP	Develop List	List Developed/ Updated	x	x	x	x	x

Objective 3.6	Continue to provide technical and financial support for wetland activities.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year					
										0	1	2	3	4	0
3.6	a.	Work with the WPP, WRC, State Parks, and MDC and other entities to develop criteria for wetland protection prioritize wetlands for protection and restoration planning activities (Table 12).	2020	2022	Annually/ Long-Term	319/WPP/ Partners	319 PPG & Project/ Partners	Meeting	Develop Criteria	x	x	x			
	b.	Work with the WPP, WRC, State Parks, and MDC and other entities to prioritize wetlands for protection and restoration planning activities (Table 12).	2022	2025	Annually/ Long-Term	319/WPP/ Partners	319 PPG & Project/ Partners	Develop List	List Developed/ Updated				x	x	x
Objective 3.7	Other studies.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year					
										20	21	22	23	24	
3.7	a.	Work in priority areas where the Department has partnered with USACE on feasibly studies to address large scale water quality issues in watersheds identified in the studies (e.g. Lower Grand, Meramec/Big River).	2020	2025	Annually as needed/ Long-Term	319/DEQ/WPP /USACE	319 PPG & Project/ Partners	Review feasibility as alternative plan	Alternative Plan Approved by EPA	x	x	x	x	x	
3.8	b.	Work with the MDC to determine were MDC Opportunity areas overlap with 319 NPS project planning and implementation priorities.	2020	2025	Ongoing/ Long-Term	319/MDC	319 PPG & Project/ MDC	Annual Meeting/ Survey	List of Potentially Shared Opportunities	x	x	x	x	x	
Objective 3.8	Develop list of points of contacts for each partnering organization.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year					
										20	21	22	23	24	
3.8	a.	Send email to partnering organizations to determine main points of contact per subject item (e.g. organizations priorities, planning, water quality monitoring, implementation, outreach, etc.).	2020	2025	Annually as needed/ Long-Term	319/ Partners	319 PPG/ Partners	Annual Meeting/ Survey	List of Contacts	x	x	x	x	x	
3.8	b.	Check on the feasibility of the Department to create a data warehouse or share point site to allow partners and stakeholders to share information.	2020	2025	Ongoing/ Long-Term	319	319 PPG/	If feasible	Develop site	x	x				

Goal 4.	Implementation of Restoration and Protection Projects													
Improve and protect the water quality of Missouri’s surface waters and groundwater by reducing NPS pollutants such as nutrients, sediments, and bacteria; restoring aquatic habitats; and re-establishing flow regimes that mimic natural conditions.														
Objective 4.1	Continue to support NPS restoration projects.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
4.1	a.	Solicit proposals and fund §319 eligible restoration strategies in critical areas identified in EPA-accepted 9-element WBPs proposed by §319 grant applicants whose implementation applications rank high for funding (<i>Also reported under Goal 3, Objective 3.2</i>).	2020	2025	Annually/ Long-Term	319	319 Project	Annual RFP	319 NPS Projects	x	x	x	x	x
Objective 4.2	Continue to support NPS protection projects.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
4.2	a.	Solicit proposals and fund §319 eligible protection strategies in critical areas identified in EPA-accepted 9-element WBPs proposed by §319 grant applications whose implementation applications rank high for funding (<i>also reported under Goal 3, Objective 3.3.a</i>).	2020	2025	Annually/ Long-Term	319	319 Project	Annual RFP	319 NPS Projects	x	x	x	x	x
Objective 4.3	Continue to leverage SWCP Activities.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
4.3	a.	Continue to leverage conservation practice implementation activities of the SWCP in critical areas identified in EPA-accepted 9-element WBPs (<i>also reported under Objective 1.1</i>).	2020	2025	Annually/ Long-Term	319/SWCP	319 Project/ SWCP	EPA-Accepted WBPs	# Leveraged Areas	x	x	x	x	x
Objective 4.4	Investigate opportunities to leverage or support other nonfederal NPS implementation or protection activities in critical areas identified in EPA-accepted 9-element WBPs.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
4.4	a.	Forestry/Private Lands BMPs: stream bank stabilization; riparian buffer, sediment traps (not located in “waters of the state”); road and trail design, construction, maintenance, and closure conforming to standards; water bars; temporary bridges/culverts; seeding skid trails and other eroding areas; fords; diversions; log landings; silt fences.	2020	2025	Annually/ Long-Term	319/Partners	319 Project/ partners	Annual Partners Meeting/ Survey	List of Potential Opportunities for Leverage/Projects	x	x	x	x	x

4.4	b.	DNR LRP Abandoned Mine Lands BMPs: erosion controls; grading; lime and other chemicals to treat acid mine drainage; revegetation; phytoremediation; soil amendments; soil removal/disposal; drainage controls; well abandonment; ground water remediation; mine share and adit (horizontal tunnel) closings; ditches to divert surface water from mine waste, tailings or mine works; removal and consolidation of small waste piles; removal of large waste piles from water sources; relocation of stream from waste rock dump or tailings pile; capping waste rock piles or tailings with uncontaminated soils followed by revegetation; aeration and settling ponds to promote precipitation of metals from mine drainage; sulfate-reducing wetlands; oxidation wetlands; passable acid mine drainage treatment facilities; active acid mine drainage treatment facilities; as well as agricultural management practices to improve soil structure and fertility while reducing erosion.	2020	2025	Annually/ Long-Term	319/LRP	319 Project/ partners	Annual Partners Meeting/ Survey	List of Potential Opportunities for Leverage/Projects	x	x	x	x	x
4.4	c.	Aquatic habitat restoration: low head dam removal/fish passage barriers; stream bank stabilization; wetland restoration/creation; National Fish Habitat Program; dredging lakes; natural channel/two-stage ditch/self-forming channel and other restoration designs; and levee or dike modification/removal.	2020	2025	Annually/ Long-Term	319/Partners	319 Project/ partners	Annual Partners Meeting/ Survey	List of Potential Opportunities for Leverage/Projects	x	x	x	x	x
Objective 4.5	Explore the opportunities to work with state and county health departments.		FY Start	FY End	Frequency	Responsible Party	Funding Source	Measure	Product/ Outcome	Reporting Year				
4.5	a.	Determine feasibility of the development of a statewide or regional onsite wastewater pump out and replacement program.	2020	2022	Annually/ Short-Term	319/FAC/ DHSS	319 PPG/ partners	Meeting with DHSS	Program Development	20	21	22	23	24
Objective 4.6	Explore opportunities to streamline the process for tracking WBPs.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
4.6	a.	Work with EPA to explore opportunities for the Watershed Tracker in GRTS to assist with tracking, reporting, pollutant load reductions for each WBP.	2020	2022	Annually, as needed/ Short-Term	319/EPA	319 PPG	Process Identified	Tracker Developed	20	21	22	23	24

Goal 5	Public Engagement													
Develop and implement a strategic outreach and engagement program.														
Objective 5.1	Continue to review and update written and electronic materials and promote the §319 NPS Program at various venues.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
5.1	a.	Annually review §319 NPS printed and electronic materials and update and republish as needed.	2020	2025	Ongoing/ Long-Term	319	319 PPG	Annual Review	Materials developed or updated	20	21	22	23	24
5.1	b.	As needed review and update the 319 NPS webpages.	2020	2025	Ongoing/ Long-Term	319	319 PPG	Annual Review	Webpages Updated	x	x	x	x	x
Objective 5.2	Continue to provide technical and financial support citizen water quality monitoring training through the Missouri Stream Team, VWQM program ⁶⁵ . (also reported under Goal 2, Objective 2.4.)		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
5.2	a.	Introductory Workshop	2020	2025	Annually/ Short-Term	WPS/MDC	319 PPG/ MDC	Training Completed	# of Trainings Scheduled/ # people Attending/	20	21	22	23	24
5.2	b.	Level 1 Workshop:	2020	2025	Annually/ Short-Term	WPS/MDC	319 PPG/ MDC	Training Completed	# of Trainings Scheduled/ # people Attending/	x	x	x	x	x
5.2	c.	Level 2 Workshop:	2020	2025	Annually/ Short-Term	WPS/MDC	319 PPG/ MDC	Training Completed	# of Trainings Scheduled/ # people Attending/	x	x	x	x	x
5.2	d.	Level 3 Evaluation:	2020	2025	Annually/ Short-Term	WPS/MDC	319 PPG/ MDC	Training Completed	# of Trainings Scheduled/ # people Attending/	x	x	x	x	x
5.2	e.	Cooperative Stream Investigation (CSI):	2020	2025	Annually/ Short-Term	WPS/ESP/ MDC	319 PPG	# of Projects	QAPPs	x	x	x	x	x
Objective 5.3	Highlight §319 NPSs program and project successes of the NPS program, including partner projects.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
5.3	a.	Annually produce one NPS success story (based upon Goal 2, Objective 2.7.b).	2020	2025	Annually/ Short-Term	319	319 PPG	Biennial Review of 303(d) List	NSP Success Story Developed	20	21	22	23	24
5.3	b.	Publicize NPS successes on the Department’s 319 NPS website.	2020	2025	Ongoing/ Long-Term	319	319 PPG	# postings/ web hit counts	Webpage Updated	x	x	x	x	x
Objective 5.4	Utilize a variety of methods to engage the public.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
5.4	a.	Social media (Twitter Facebook, etc.).	2020	2025	Ongoing/ Long-Term	319	319 PGG		Information Posted	20	21	22	23	24

⁶⁵ <https://dnr.mo.gov/water/get-involved/volunteer-water-quality-monitoring-program>

5.4	b.	Public events (i.e., Earth Day, State Fair, and other events).	2020	2025	Ongoing/ Long-Term	319	319 PPG		Information Posted	x	x	x	x	x
5.4	c.	Promote the Missouri §319 NPS Program at various venues, highlighting program purpose, requirements, types of eligible projects	2020	2025	Ongoing/ Long-Term	319	319 PPG	Venues Attended	Information Presented	x	x	x	x	x
5.5	d.	Meetings, conferences, and workshops (e.g., Water Protection Forum, Missouri Natural Resources Conference, FAC workshops, Water Quality Coordinating Committee).	2020	2025	Ongoing/ Long-Term	319	319 PPG	Venues Attended	Information Presented	x	x	x	x	x
Objective 5.5	Partners NPS outreach efforts.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
5.5	a.	Explore opportunities to leverage partner outreach activities relating to NPS pollution issues and efforts to protect high quality streams and actions that can be taken to restore threatened and impaired waters (<i>also reported under Goal 1, Objective in 1.6.a</i>).	2020	2025	Ongoing/ Long-Term	Partners	319 PPG/ Partners	Annual Partners Meeting/ Survey	Venues Identified	x	x	x	x	x
Objective 5.6	Partners NPS Watershed Workshop.		FY Start	FY End	Frequency	Responsible Party/Partner	Funding Source	Measure	Product/ Outcome	Reporting Year				
										20	21	22	23	24
5.6	a.	Investigate possibilities to host §319 NPS watershed workshops	2020	2022	Ongoing/ Long-Term	319/Partners	319 PPG/ Partners	Committee formed	Workshop Scheduled by 2023	x				

CHAPTER 8: MISSOURI NONPOINT SOURCE ADMINISTRATION PROGRAM

PERFORMANCE PARTNERSHIP GRANT (PPG)

Missouri uses PPGs, which are designed to provide greater flexibility to states to address their pollution problems holistically as measured by environmental goals and indicators, and to move away from a focus on specific, narrowly-defined outputs. The overall goal for the state is to reduce NPS impaired water bodies, which will be a cumulative effort using all WBPs. Effectiveness will be measured on a watershed-by-watershed basis to determine whether watersheds are meeting water quality goals and milestones stated within EPA-accepted WBPs.

Section 319 NPS grant funds are contributed annually to the PPG to help support the NPS program and other essential Department functions regarding improved water quality. The PPG and other collaborative watershed-based approaches (e.g., statewide watershed planning effort) have become increasingly important to water quality restoration efforts. The costs associated with addressing NPS impairments using only §319 NPS program funds are not adequate considering current funding levels, the extent of NPS impairments, and the numbers and types of sources contributing to NPS pollution.

A variety of technical staff positions with expertise in the following areas are supported with §319 NPS project and PPG funds:

- §319 NPS program management,
- §319 grant financial management,
- Stream Team VWQM program training,
- Watershed planning,
- Stream hydrology,
- Lake and stream limnology,
- Agricultural BMPs,
- Agricultural stormwater runoff,
- Urban stormwater runoff,
- Water quality monitoring and assessment,
- Water quality modeling,
- Water quality standards,
- Development of pollution load reduction studies,
- Development of WBPs, and
- Education and outreach.

These diverse areas of expertise complement and enhance the Missouri §319 NPS Program by improving the effectiveness and efficiency of program management and implementation. In addition, annual allocations of §319 and PPG funds support several of Missouri's water quality monitoring programs (e.g., Missouri's RCPP project; ambient, lake, TMDL, and WQS; benthic sediment; and citizen volunteer water quality).

Missouri's financial management of the program involves following generally accepted accounting principles (GAAP) guidelines issued by the Governmental Accounting Standards Board, State of Missouri code of regulations, applicable federal OMB Circulars and the Code of Federal Regulations (CFR Part 40). The SWCP and WPP fiscal management and grants management staff support Missouri §319 NPS Program through a variety of fiscal staff with expertise in the following areas:

- Grant application development,
- Work plan development and coordination,
- Internal controls,
- Grant tracking and reporting,
- Fiscal accountability,
- Applicant capability determination,
- Risk assessment,
- Budget development,
- Fiscal and programmatic monitoring,
- Procurement standards,
- Standards for Financial Management Systems,
- Federal and state laws/regulations,
- Code of Federal Regulations, and
- EPA's GRTS.

Regular reviews and reports, along with coordinated communication among Department managers, provide effective and efficient management and obligation of funds for §319 NPS efforts. Missouri makes extensive use of GRTS, as required by §319 grant conditions, for project and grant reporting, budget tracking, and documenting environmental results.

Federal Funding

The following is a brief description of several potential federal funding sources to help support state NPS efforts.

CWA of 1987, §104(b): §104(b) grants may be used for activities associated with wetlands. Some grants require nonfederal match.

The Clean Water SRF: Congress established the Clean Water State Revolving Fund (CWSRF) program in 1987. The CWSRF loan program was established by the 1987 CWA amendments to provide a renewable financing source for statewide wastewater infrastructure and runoff control while protecting state surface and ground waters. The Department administers the CWSRF.

The CWSRF Program dollars typically helped municipalities build or improve wastewater treatment plants. However, conservation, agricultural, and urban projects may also be funded through the CWSRF. These types of projects include stormwater, water reuse and conservation, wetland protection and restoration, on-site sewage disposal systems, riparian buffers and conservation easements, and source water protection. Additional information can be found at:

<https://dnr.mo.gov/water/business-industry-other-entities/financial-opportunities/financial-assistance-center/wastewater>.

CWA §604(b) Water Quality Management Grants: Federal funds from §604(b) of the CWA are awarded annually to the Department to carry out planning activities under §303(e) and §205(j) of that act. Section 303(e) requires the state to have a continuing planning process and §205(j) addresses water quality management planning. The grant funds are used both for program implementation by the Department and for funding specific eligible projects by regional planning commissions and councils of governments. Federal Water Quality Act Amendments require states to pass through 40 percent of annual §604(b) funds to regional public comprehensive planning organizations and interstate organizations. The Department's current focus with these funds are for the prevention, control, and/or abatement of water pollution in a manner that improves the ability of small communities to provide cost-effective wastewater treatment services to their residents, institutions and businesses and in areas with water bodies identified on the Missouri 2016 §303(d) List of impaired waters.

Safe Drinking Water Act of 1996 (SDWA): The SDWA provides funding for a drinking water revolving fund which is used to provide low interest loans to public water systems for capital improvements (e.g., planning, design and construction of water plants, tanks, lines).

USDA/NRCS Environmental Quality Incentives Program: EQIP is the largest NRCS cost-share program. The EQIP offers cost-share contracts to agricultural producers for implementing conservation practices. Landowners or farm operators who are engaged in livestock or agricultural production on eligible land may participate in the EQIP program. The EQIP conservation practices and activities are implemented in accordance with an EQIP plan of operations developed with the producer, which identifies the appropriate conservation practice or measures needed to address resource concerns. The practices must be implemented in accordance with NRCS technical standards adapted for local conditions. Historically underserved producers (limited resource farmers/ranchers, beginning farmers/ranchers, socially disadvantaged producers) may be eligible for an increased percentage of payments toward the estimated approved costs. Information regarding the EQIP program and other USDA NRCS programs is available at: <http://www.nrcs.usda.gov/programs/>.

State Funding

State funding for NPS water quality issues is available through several state agencies including:

- DNR
- MDC
- MDA
- DHSS

State funding sources include: (<https://dnr.mo.gov/water/business-industry-other-entities/financial-opportunities/financial-assistance-center>)

- Missouri Soil and Water Conservation Cost-Share Program through the SWCP for agricultural resource concerns;

- Waste Management Program funding through grants or fees that address NPS issues (e.g., abandoned landfills, hazardous household waste, and pesticide collection);
- Natural Resource Damages Assessment Fund;
- Abandoned Well Plugging Grant Program;
- SWP Development and Implementation Grant Program; and
- SRF

The Department of Agriculture (<http://mda.mo.gov/abd/financial/>) provides:

- NPS Animal Waste Treatment System Loan Program
- Pesticide Technical Services

The Department of Conservation (<http://mdc.mo.gov/>) provides funds and services such as:

- Stream Stewardship Trust Fund
- Various educational programs including forestry, wetlands, understanding streams and native species management
- Technical advice and funds for stream and riparian restoration

Missouri Conservation Heritage Foundation's Stream Stewardship Trust Fund (MCHF - SSTF):

The Stream Stewardship Trust Fund is a voluntary in-lieu fee mitigation program to which developers can make payments to meet the requirements of §404 of the CWA and §10 of the Rivers and Harbors Act. Since it began administering this fund, the Foundation has disbursed approximately \$5 million for priority stream protection efforts. A Memorandum of Understanding between the MCHF and USACE authorized and established operating conditions for the Trust Fund. Resources are earmarked for restoration, enhancement and protection of streams and associated riparian habitats (<http://mochf.org/stream-stewardship-trust-fund/>).

The Department of Health and Senior Services (<http://health.mo.gov/index.php>) provides assistance with:

- Well testing
- On-site wastewater facility inspections

NPS Program Funding Allocations

Section 319 NPS grant funding is generally available to the Department on an annual basis for pass-through funding of eligible statewide and watershed-based projects (Appendix 13). The allocation of §319 grant funds to states is based on an EPA formula. The §319 grant funds received from EPA are allocated according to the most recent EPA§319 guidance. Funds are awarded based on an RFP to help watershed groups, government agencies and educational institutions implement practices that will reduce NPS impairments in §303(d) listed, impaired water bodies or protect threatened and high quality waters from NPS degradation. The purpose for the funding is to support education, assessment, monitoring, planning and implementation resulting in on-the-ground practices that restore, improve, or protect water quality from NPS pollution. The focus of targeted restoration and protection projects solicited may vary from RFP to RFP. A nonfederal match of 40 percent is required for §319 grant funds awarded to Missouri.

Subawards support the Missouri §319 NPS Program and can be both noncompetitive and competitive. Project awards and methods will vary depending upon program need, urgency of priorities, availability, and qualifications of recipients. Missouri will offer a variety of subawards including subgrants to address NPS concerns as described in this plan.

Appendix 13 provides additional information about EPA allocation history and provisions for an exemption from the “50 Percent Watershed Funding Requirement for Substantial State Fund Leveraging” and the waiver process.

MINIGRANTS

Minigrants usually focus on information and education needs targeted to NPS impaired watersheds or other priority watersheds that lack local support for watershed initiatives. Minigrants can be used to build capacity, help form stakeholder groups, and introduce watershed-based approaches to improve local water quality. Minigrant availability is currently inactive. The Department plans to reinstate the program in the upcoming years. In the future, a limited amount of funds will be set aside for the program. Applications will be accepted or solicited on a case-by-case basis.

WATERSHED-BASED PLAN SUBAWARDS

The WBPs must adequately address EPA’s nine-critical elements or alternative plan criteria (Appendix 8). Collaborative assessment and planning approaches are expected through committed partnerships to coordinate activities, maximize efficiency, and leverage funds. The Department targets these opportunities and subcontracts 9-element planning or acceptable alternative plans to qualified organizations.

PROTECTION AND IMPLEMENTATION SUBAWARDS AND TECHNICAL RESOURCES

Subgrants, other funding sources, and technical resources are provided to qualified entities to implement WBPs and address state NPS priorities and protection efforts. Projects can vary in size and scope with the focus of implementing watershed goals. Partner agencies often provide funding and/or technical assistance in developing WBPs.

One of the key components of an effective state NPS management program is to allocate resources between abating known water quality impairments and protecting threatened and high quality waters from significant threats by present or future NPS impacts. Meeting this component can be accomplished in various ways such as providing grant funding or other partner funding, providing technical resources and education on the status of the quality of Missouri waters, etc. Many of the WBPs that are already developed, being updated, or new plans to be developed will include protection efforts already in place or protection strategies to be developed.

Some protection goals might include the following:

- Conserve the unique natural resources in the watershed by maintaining aquatic and terrestrial health and diversity, water quality and quantity, and habitat connectivity.
- Promote a well-designed environment that conserves the community character, conserves watershed natural resources, and fosters a sense of place.
- Preserve a high level of quality public and semi-public infrastructure and services.

- Foster a partnership among citizens, local governments, state government, nongovernmental organizations, regional initiatives, and agencies.

PROJECT SOLICITATION

Keys to the success of Missouri's watershed projects include holistic, collaborative planning, prioritizing watersheds, and targeting cost-effective conservation practices. Depending upon Department needs and priorities, project solicitation is conducted using a variety of methods including: RFPs, non-competitive awards, contracts, and cooperative or joint funding agreements. Funding is limited to eligible applicants in priority watersheds and conservation practices as discussed in this plan. This flexible solicitation process allows the state to target specific priority areas for better success and cost-effectiveness.

Funding decisions for subawards will be made based in part on the qualifications listed below (note: fewer or additional requirements may be included in subaward solicitations).

- Existing strong, diverse and committed partnerships to ensure project/WBP implementation (or accepted alternative plan), and long-term operation and maintenance for installed conservation practices. Partnerships must be demonstrated by established commitments or agreements among organizations, government entities and watershed residents to implement practices in a timely fashion. Partnership agreements with local Soil and Water Conservation Districts (SWCDs), University of Missouri Extension, NRCS, local/state governments, or other organizations are strongly encouraged.
- A water quality monitoring component that meets the objectives outlined in the WBP. The monitoring may be provided by the recipient, contractor, the Department, or another partnering agency. The monitoring component, new or existing, must be capable of documenting major water quality improvement or decline. Other measures or indicators that may be used to show progress toward water quality improvements must be approved by the Department.
- The ability to track and report load reductions from the project using reduction estimates based on known measures for conservation practices or watershed models.
- Clear, measurable milestones and an implementation schedule that clearly demonstrates interim steps, timely implementation of practices and fund usage.
- A cost-effective approach to achieving measurable water quality benefits through the implementation of management practices; only high ratios of on-the-ground conservation practices to administration and/or salary will be considered.
- A complete, well developed budget that links cost to specific activities or milestones. All administrative, information and education salaries should comprise no more than 20 percent of the federal funds requested.
- A limited, low-cost information and education component that does not exceed 10% of the federal funds requested; any salary and administration cost associated with this component should be included in the 20 percent total described in the RFP.
- A documented history of meeting grant requirements and successfully fulfilling subgrant agreements, including: fiscal accountability, achieving project milestones, conservation practice implementation, and projected pollutant load reductions.
- Staff with the capability, expertise, resources and experience to perform the proposed

work and grant administration, and must have written organizational policies and procedures in place prior to applying.

As the Missouri §319 NPS Program continues to evolve during the next five-year planning period, the above criteria may be modified, as needed, to improve program effectiveness. More information regarding Missouri's §319 NPS grant programs is available at <https://dnr.mo.gov/about-us/division-environmental-quality/soil-water-conservation-program>.

SECTION 319 PROJECT FUNDING PRIORITIES

As §319 NPS grant funding becomes insufficient to meet project demands, the state program will need to rely more on partners and stakeholders to carry out much of the NPS pollution remediation and water quality protection activities. In this regard, Missouri is fortunate to have the best-funded state conservation cost-share program in the nation. Further, progressive USDA conservation/easement programs work closely within the statewide watershed planning framework to determine where to target conservation cost-share dollars in high priority impaired and high-quality waters with accepted WBPs.

It is expected that most available §319 NPS grant funds will be targeted by the Department for activities that other Department programs and organizations are unable to address (e.g., watershed planning, protection of high-quality waters, water quality monitoring and assessment, development of NPS WBPs and NPS load reduction studies, demonstrations of new technologies and innovative conservation practices, addressing urban NPS, and education and outreach). Pursuant to this approach, Missouri will report information in EPA's GRTS database regarding combined efforts of its state cost-share program and the NPS partners that collaborate on §319 NPS projects, using leverage funds from BMPs implemented by the Department's SWCP in watersheds with accepted WBPs or alternative plans. This will better demonstrate the overall progress in reducing NPS pollution loads in the state.

BALANCED STATEWIDE AND WATERSHED-BASED APPROACH

The Department uses a balanced approach that emphasizes both statewide NPS programs and on-the-ground management of individual watersheds where waters are impaired and threatened. The NPSM program strives to connect national and statewide resources with local watershed needs. The Department has several in-house and EPA collaborative initiatives to help streamline and create effective program and budget approaches that focus on improving water quality. More information on Missouri's overall watershed planning and prioritization efforts are provided in Chapters 6 and 10. Both statewide and regional projects are essential to ensure effective educational outreach, technology sharing, monitoring strategies and larger scale initiatives such as regulatory needs.

Consistent with these watershed planning efforts, Missouri §319 NPS Program emphasizes support of community-based planning and implementation projects that address watershed specific concerns and impairments. The Department will continue to support and encourage development of EPA recommended 9-element WBPs for watersheds and subwatersheds. Note, however, watershed planning that does not outpace implementation efforts and alternative approaches must be considered for a balanced approach to protection and restoration based upon current data and opportunities. During this five-year MNPSMP period, state funded watershed-

based planning may be controlled so as to not overly outpace implementation of existing plans. This will help ensure that current information guides plan development and implementation. The Missouri §319 NPS Program will help build capacity and strategy in subwatersheds with a goal of focusing the majority of available funds to implement water quality improvement projects.

The Missouri §319 NPS Program supports statewide projects as well as narrowly focused projects when there is a more suitable approach. Current and projected statewide participants and efforts for the grant program include:

- Various water quality monitoring activities
 - Lakes of Missouri Volunteer Program Monitoring Network <http://lmvp.org/>
 - Missouri Stream Teams/Volunteer Water Quality Monitoring Program <http://www.mostreamteam.org/>
 - Volunteer Water Quality Monitoring Program <https://dnr.mo.gov/water/get-involved/volunteer-water-quality-monitoring-program>
 - §319 NPS project monitoring
 - Department sponsored water quality monitoring programs <https://dnr.mo.gov/water/how-water/water-monitoring-data/quality-streams-rivers-lakes-wetlands/ambient-wadeable>
- Interactive Watershed Mapping Web Site (Department) <https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=0f96557330dd40bab1a7a2e629ec6e2a>
- Water Quality Reporting <https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters>
- Missouri Water Quality Monitoring Strategy <https://dnr.mo.gov/document-search/proposal-water-quality-monitoring-strategy-missouri-ffy-2015-2020>
- Missouri Watershed Conference
- Water Protection Forum and associated committees (e.g. Water Quality Coordination Committee) <https://dnr.mo.gov/about-us/forums-stakeholder-groups> Information and Outreach Efforts
 - NPS webpage updates
 - Brochure development
 - NPS Display
 - Presentations

Reporting Requirements

All §319 (h) grant programs are subject to the reporting requirements specified within 30 CFR parts 31 and 35, which outlines a range of administrative reporting requirements including performance and financial reports.

PERFORMANCE AND PROGRESS DETERMINATION

§319(h)(10) authorizes EPA to request information, data, and reports, as necessary, to determine a state's continuing eligibility to receive §319 grants under an annual performance and progress determination.

GRANTEE PERFORMANCE REPORTS

40 CFR 31.40(b)(1) requires states to submit performance reports on the status of § 319 grants. At a minimum, states should submit these reports on an annual basis by a date agreed to by the EPA region and the state. Final reports are due 90 days after the expiration or termination of grant agreement, pursuant to 40 CFR Part 31 (the full Code of Federal Regulations can be found online at ecfr.gpoaccess.gov). Performance reports should include at a minimum:

- Performance/milestone summary: A listing of major program and project accomplishments for the period (based on the project and program milestones or commitments contained in the approved work plans, grant agreements, or special terms and conditions), as well as progress made toward meeting future milestones. The state may accomplish partial or the entire reporting requirement through its annual report, as discussed above.
- Slippage reports: Provide reasons for delays in meeting scheduled milestones/commitments and discuss what actions (state, federal or other) will be taken to resolve any current or anticipated problems.
- Additional pertinent information including, analysis and explanation of cost overruns, unanticipated events/consequences, etc.

GRTS REPORTING

States are required to use the Grants Reporting and Tracking System (GRTS) database to report all nationally mandated elements described in the most recent GRTS memorandum located on the GRTS website (www.epa.gov/nps/grts). The mandated elements are comprised of parameters that EPA needs in order to successfully account for accomplishments of the §319 NPS program. GRTS has the capacity to accept additional information on state programs and projects beyond the mandated elements outlined in the most recent GRTS guidance (e.g. upload into the GRTS system copies of WBPs (or acceptable alternative plans), project implementation plans, or other documents, such as photographs, evaluations, and invoices).

To ensure EPA GRTS requirements are met, §319 NPS staff enter project information into the database after they have been reviewed and approved by the Department. At least twice a year, project status updates are completed and status reports uploaded. Annually, staff summarize and compile all project efforts for planning, implementation, water quality monitoring, and outreach activities. This information is incorporated into an annual report for activities completed during the previous federal fiscal year. For implementation projects within EPA-accepted 9-element watershed-based planning areas, the number, types, and size of the management and conservation practices implemented and the calculated pollutant load reductions for total nitrogen, total phosphorus and sediment are entered into GRTs.

ANNUAL REPORTS

§319(h)(11) requires states to report annually on progress in meeting the schedule of milestones contained in their NPS management programs, and, to the extent information is available, report reductions in NPS pollutant loadings and improvements in water quality resulting from program implementation. This information may be provided in the format suggested immediately below. States may wish to use GRTS to meet some of their annual reporting requirements.

- A brief summary of progress, including evidence/examples, in making progress toward meeting approved milestones and the short and long-term goals and objectives identified in the MNPSMP.
- A matrix displaying milestones from the current year for the approved state NPS management program with the following information for each milestone:
 - Applicable project or program
 - Scheduled project completion date
 - Percent completed
 - Leveraged funds
 - A discussion of the extent to which federal agencies, lands and activities within the state are supporting the state in meeting approved milestones.
 - A summary of the available information on the extent of reductions in NPS loadings achieved as a result of NPS program implementation.
 - A summary of the available information about improvements in water quality (including aquatic habitat quality) as a result of NPS program implementation. This can address, for example, progress towards water quality standards, TMDL load reductions implemented, trends in aquatic biology, or other measures of progress used by the state.
 - For waters or watersheds where implementation is underway but information on load reductions and water quality improvement is not yet available , surrogate measures of environmental progress should be used and progress should be reported in terms of the degree or percentage of project completed.

CHAPTER 9: ADAPTIVE MANAGEMENT AND STRATEGIC APPROACHES

Adaptive management is used when natural resources are responsive to management, but there is uncertainty about the impacts of management interventions. In its simplest form, adaptive management is learning by doing and adapting based on what's learned. Applications usually involve dynamic natural resource systems that are only partially predictable and involve multiple sources of uncertainty that limit effective management. Adaptive decision making is based on the recognition of alternatives to resource management and uses monitoring data to assess those alternatives.

Adaptive Management Framework

The Department reviews and revises the MNPSMP at least every five years using an adaptive management cycle. Figure 9 shows a diagram of the adaptive management cycle used by the Department for watershed planning.

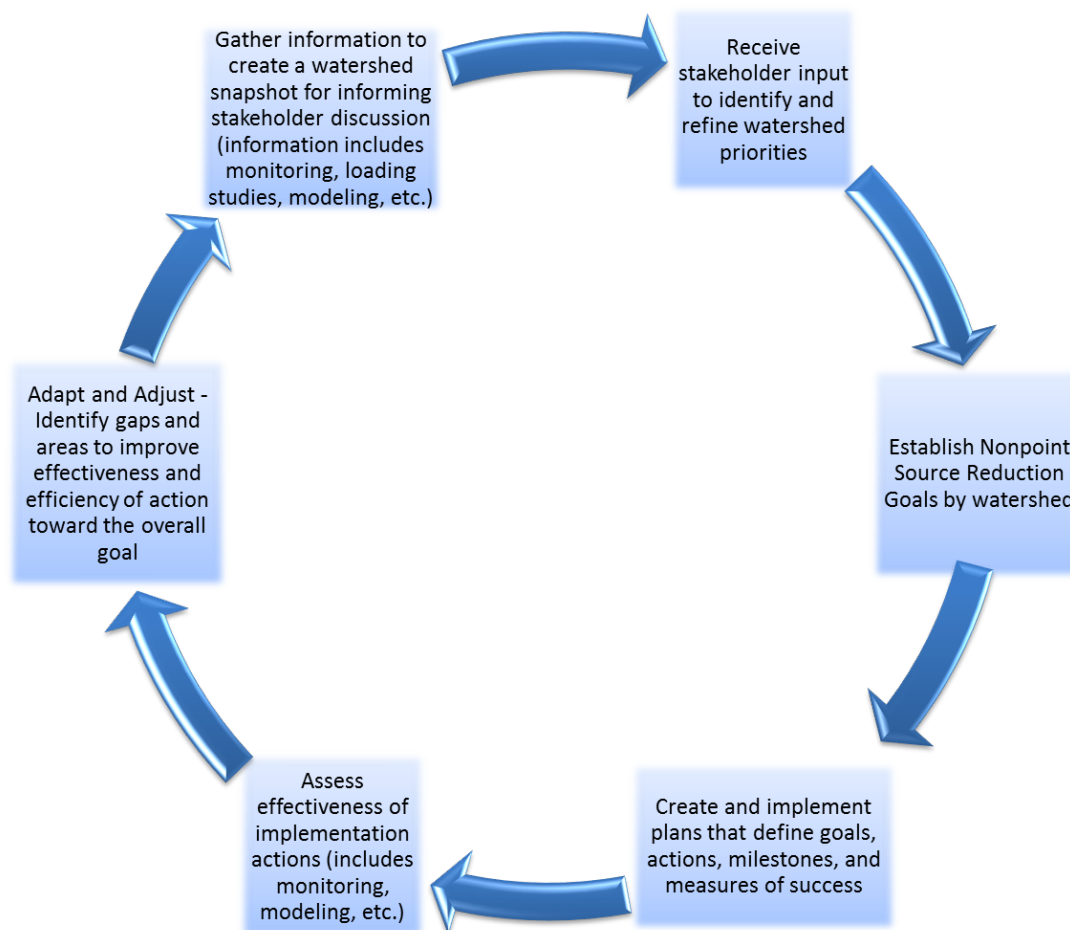


Figure 9. Missouri's adaptive management cycle.

Strategic Approaches

The Department's watershed planning approach is consistent with EPA's Guide to Watershed Planning, which helps to facilitate NPS water quality assessment and planning activities, education and outreach efforts, identification of critical source areas of impaired waters, and geographic targeting of cost-effective conservation practices.

The Department's Division of Environmental Quality addresses NPS issues through a variety of state and federal programs which use voluntary approaches that work collaboratively with the §319 NPSM program. These collaborative, strategic approaches for addressing NPS pollution are summarized below.

Water Protection Program

The WPP's **Watershed Protection Section** consists of three units: TMDL/Modeling, Monitoring and Assessment, and Water Quality Standards. Each unit is represented on teams that review WBPs, Requests for Proposals, NPS project plans, and various processes associated with the §319 NPS Program. Staff in these units contribute significantly to the overall success of the §319 NPS Program by providing technical expertise and assistance with monitoring, modeling, watershed planning, and project designs associated with NPS pollution loads. Along with the §319 NPS Program staff, these staff may provide assistance, as needed, by attending watershed planning meetings with stakeholders and communities who are developing their own WBPs so that these watershed entities are well informed and have the tools necessary to develop a comprehensive and acceptable plan.

The **Public Drinking Water Branch (PDWB)** regulates public water systems and administers the Missouri SWP program. Authorized by the 1996 amendments to the federal Safe Drinking Water Act, the SWP program provides guidance and technical assistance to communities to enhance protection of local drinking water sources through localized, voluntary efforts and activities. Although public water systems are not required to participate with the program, the PDWB provides unique source water assessment reports for every public water source in the state that recommend protection areas, known potential sources of contamination, risk assessments, and other general information. In conjunction with routine water quality monitoring of drinking water supplies, this information helps water systems identify credible threats to their water sources and provides a foundation upon which they can develop and implement water quality best practices to address priority concerns.

The SWP program provides a unique opportunity for local communities to become engaged with larger, regional water quality protection efforts such as those envisioned through the statewide watershed planning efforts. Missouri's SWP program is a voluntary program supporting local efforts to protect drinking water sources. The program offers public water systems an opportunity to learn about a broad range of approaches to protect their water supply and points water suppliers to funding and other resources available to support such local efforts.

Local source SWPs, submitted by local communities, are reviewed by PDWB and NPS staff and ultimately approved by the Department. One of the Department's goals is to better integrate the CWA and Safe Drinking Water Act programs and opportunities. More information about the

SWPP and available grants can be found at: <https://dnr.mo.gov/water/what-were-doing/water-planning/source-water-protection>.

The **FAC** manages several financial activities, including the State Revolving Fund (SRF). Many of the resulting SRF-funded projects address NPS issues (e.g., remediation and hookups of individual on-site waste management systems to sewer lines, sewage treatment plant improvements, and the design and construction of animal waste treatment and composting facilities).

The Department's SRF programs encourage funding recipients to use green components, which help achieve environmentally sustainable solutions for infrastructure needs. The Green Project Reserve (GPR) became a provision of the CWSRF and Drinking Water SRF programs in 2009 as a result of the American Recovery and Reinvestment Act. Certain federal capitalization grants, since 2009, have included language relating to the establishment of the GPR. The amount for FFY2015 targeted for these efforts is \$3,892,500.

Soil and Water Conservation Program

Since December 2014, the §319 NPS program is a unit within the SWCP after the SWCP was moved to the DEQ. The organizational realignments were strategically implemented to elevate coordination between the SWCP and WPP programs and enhance achievement of MNPSMP goals and objectives.

The **SWCP** works closely with the 114 local SWCDs, which share space with the NRCS field services areas in most counties in Missouri. These collaborative efforts are essential in implementing NPS conservation practices through voluntary technical and financial assistance to landowners.



Photo 9. Missouri Farm Land

CHAPTER 10: FEDERAL CONSISTENCY REVIEWS

An effective NPS program identifies federal actions that are not managed consistently with state NPS management goals and objectives. Where appropriate, the state seeks EPA assistance to help resolve these issues. Section 319 of the CWA requires states to review federal assistance and development programs and projects for consistency with their NPS programs. The CWA also directs federal agencies to modify their regulations to accommodate state reviews of individual applications and to address the identified concerns in accordance with Executive Order 12372. In August 1998, the EPA proposed federal guidelines for implementation of §319 consistency provisions.

Many protocols for reviewing these activities already exist at the state level. These include the State Clearinghouse administered by the Office of Administration and the National Environmental Policy Act, which mandates the environmental assessment and environmental impact statement processes. The success of these review processes depends on the ability of the state and federal agencies to work cooperatively to resolve any conflicts. In addition to major federal actions, which are subject to these procedures, other federal permits and licenses may also require reviews to determine consistency with the NPS management program. The development of WBPs throughout the state will provide additional opportunities for addressing consistency on federal lands.

Specific federal assistance programs that are reviewed by the state for consistency include changes to USDA assistance programs and conservation practice specifications and the development of the USFS master plan. For USDA programs and practices, the Department's SWCP, where the NPS program staff are managed, will use their participation in the State Technical Committee to review and comment on changes as they are proposed and discussed. In addition, state staff may also review new programs or conservation practices that emerge during the period of this plan.

The federal government owns and manages land within the state of Missouri. The state will work cooperatively with the federal agencies responsible for these lands to assure they are managed in compliance with the provisions of this plan. Missouri often works with the USFS and the USACE to review plans that have NPS planning or conservation practice implementation components. Provided adequate funding is available, below are activities that will be conducted by the state to assure consistency with the NPS management program on federal lands:

- Provide a website link of the EPA-accepted NPS management plan to the director of each agency managing federal lands in Missouri.
- Visit with the land manager or other appropriate personnel of each federal agency to review provisions of the five-year MNPSMP.
- Cooperatively develop an action plan for any noncomplying issues.
- Document these reviews and any actions taken in quarterly and annual progress reports.
- Notify EPA of any unresolved issues following completion of the above activities.

The Missouri §319 NPS Program staff review and comment on federally-written plans and project designs that involve water quality-related activities on federal lands. Consistency reviews often occur when collaborative §319 grant-funded projects are located within or adjacent to federal lands. Consistency is also addressed at regularly-scheduled meetings. The Missouri single point of contact for Consistency can be found at: <https://oa.mo.gov/commissioner/federal-assistance-clearinghouse>.



Examples of Low Impact Landscaping

Photo 11. Low Impact Landscaping

APPENDICES

Appendix 1: Key components of an effective state nonpoint source management plan.⁶⁶

EPA expects all states to review and, as appropriate, revise and update their NPS management plans every five years. An updated, comprehensive plan is critical to the states' and EPA's success in addressing nonpoint source pollution. It allows EPA and the states to ensure that §319 funding, technical support, and other resources are directed in an effective and efficient manner to support efforts to address water quality issues on a watershed basis. States should refer to these key components during review and update of their programs. States must submit their updated five-year plans to EPA for approval.

1. The state plan contains explicit short- and long-term goals, objectives and strategies to restore and protect surface water and ground water.

The state's long-term goals reflect a strategically-focused state NPS management plan designed to achieve and maintain water quality standards and to maximize water quality benefits. The short-term objectives consist of activities with annual milestones that are designed to demonstrate reasonable progress toward accomplishing long-term goals as expeditiously as possible. Since the NPS management plan is a long-term planning document, the annual milestones may be more general than expected in an annual §319 grant workplan but are specific enough for the state and EPA to track progress in accordance with §319(h)(8). Annual milestones in a state's NPS management plan describe outcomes and key actions expected each year (e.g. delivering WQ-10 success stories or implementing projects in high priority impaired watersheds). The state plan includes objectives that address nonpoint sources of surface water and ground water pollution as appropriate (including sources of drinking water) in alignment with the goals of the Clean Water Act. The objectives describe implementation steps and how results will be tracked (e.g. water quality improvements, load reductions).

The state plan includes long-term goals and short-term (e.g., three- to five-year) objectives that are well integrated with other key environmental and natural resource programs, such as those described under component #3. State program goals and objectives are periodically revised as necessary to reflect progress or problems encountered, strategies to make progress towards achieving the goals, and indicators to measure progress.

2. The state strengthens its working partnerships and linkages to appropriate state, interstate, tribal, regional, and local entities (including conservation districts), private sector groups, citizens groups, and federal agencies.

⁶⁶ *EPA Nonpoint Source Program a Guidance Guidelines for States and Territories. Issued on April 12, 2013. These guidelines apply to all §319-funded grant activities beginning in fiscal year 2014*

The state uses a variety of formal and informal mechanisms to form and sustain these partnerships. Examples include memoranda of agreement, letters of support, cooperative projects, sharing and combining of funds, and meetings to share information and ideas.

The state NPS lead agency works collaboratively with other key state and local NPS entities in the coordinated implementation of NPS control measures in high priority watersheds. Interagency collaborative teams, NPS task forces, and representative advisory groups can be effective mechanisms for accomplishing these linkages, as can more informal, but ongoing, program coordination and outreach efforts. The state works to ensure that its local partners and grantees have the capacity to effectively carry out watershed implementation projects funded to support its NPS management program.

Further, the state seeks public involvement from local, regional, state, interstate, tribal and federal agencies and public interest groups, industries, academic institutions, private landowners and producers, concerned citizens and others, as appropriate, to comment on significant proposed program changes. This involvement helps ensure that environmental objectives are well integrated with those for economic stability and other social and cultural goals.

3. The state uses a combination of statewide programs and on-the-ground projects to achieve water quality benefits; efforts are well-integrated with other relevant state and federal programs.

The state has the flexibility to design its NPS management program in a manner that is best suited to achieve and maintain water quality standards. The state may achieve water quality results through a combination of watershed approaches and statewide programs, including regulatory authorities, as appropriate. The state NPS management program emphasizes a watershed management approach and includes an explanation of the state's approach to prioritizing waters and watersheds to achieve water quality restoration and protection.

The state NPS management program is well-integrated with other relevant programs to restore and protect water quality by aligning priority setting processes and resources to increase efficiency and environmental results. These include the following programs, as applicable:

- Total Maximum Daily Loads (TMDLs);
- Clean Water State Revolving Fund (SRF);
- U.S. Department of Agriculture (USDA) Farm Bill conservation programs;
- state agricultural conservation;
- state nutrient framework or strategy;
- source water protection;
- point sources (including stormwater, confined animal feeding operations and enforcement of permitted facilities);
- ground water;
- drinking water;

- clean lakes;
- wetlands protection;
- national estuary program;
- coastal nonpoint pollution control program;
- pesticide management;
- climate change planning;
- forestry, both federal (USNFS) and state;
- USACE programs; and
- other natural resource and environmental management programs.

Because of the significant resources potentially available through USDA conservation programs, the state makes a strong sustained effort to coordinate and leverage with USDA NRCS. Similarly, a state NPS management program is well-integrated and clearly identifies processes to incorporate some of the significant resources of the CWSRF loan program for eligible nonpoint source activities.

Where applicable, the state NPS management program explains how NPS projects fit into the state's prioritization scheme for CWSRF funding, and describes state efforts to increase the use of the state CWSRF for the NPS management program. If there are barriers to prioritization of NPS projects, the state NPS management program describes efforts to coordinate with the CWSRF program, and potential future steps to encourage NPS projects are considered.

If, in reviewing federal programs, the state identifies federal lands and activities that are not managed consistently with state nonpoint source program objectives, the state may seek EPA assistance to help resolve issues at the federal agency level. Federal programs subject to review by the state include the land management programs of the Bureau of Land Management and the U.S. Forest Service, USDA's conservation programs, and the USACE waterway programs, as well as development projects and financial assistance programs that are, or may be, inconsistent with the state's NPS management program.

4. The state program describes how resources will be allocated between (a) abating known water quality impairments from NPS pollution and (b) protecting threatened and high-quality waters from significant threats caused by present and future NPS impacts.

The program describes its approach to addressing the twin demands of remedying waters that the state has identified as impaired by NPS pollution and preventing new water quality problems from present and reasonably foreseeable future NPS impacts, especially for waters which currently meet water quality standards.

With limited resources, the state will likely need to make choices about the relative emphasis on restoring impaired waters and protecting high quality waters. The state's program describes how it will approach setting priorities and aligning resources between these two areas of emphasis based on their water quality challenges and circumstances.

5. The state program identifies waters and watersheds impaired by NPS pollution as well as priority unimpaired waters for protection. The state establishes a process to assign priority and to progressively address identified watersheds by conducting more detailed watershed assessments, developing watershed-based plans, and implementing the plans.

The state identifies waters impaired by nonpoint source pollution based on currently available information (e.g., in reports under sections §305(b), §319(a), §303(d), §314(a), and §320) and revises its list periodically as more up-to-date assessment information becomes available. As feasible, the state also identifies important unimpaired waters that are threatened or otherwise at risk from nonpoint source pollution.

In addition, the state identifies the primary categories and subcategories causing water quality impairments, threats, and risks across the state. At regular intervals, the state updates the identification of waters impaired or threatened by NPS pollution, preferably as part of a single comprehensive state water quality assessment which integrates reports required by the Clean Water Act. The state establishes a process to assign priority and to progressively address identified waters and watersheds by conducting more detailed watershed assessments, developing watershed-based plans, and implementing the plans. Factors used by the state to assign priority to waters and watersheds may include the following considerations:

- human health considerations, including source water protection for drinking water;
- ecosystem integrity, including ecological risk and stressors;
- beneficial uses of the water;
- value of the watershed or ground water area to the public;
- vulnerability of surface or ground water to additional environmental degradation;
- likelihood of achieving demonstrable environmental results;
- degree of understanding of the causes of impairment and solutions capable of restoring the water;
- implement ability (site-specific technical feasibility);
- adequacy of existing water quality monitoring data or future monitoring commitments;
- degree to which TMDL allocations made to point sources are dependent on NPS reductions being achieved;
- extent of partnerships with other federal agencies, states, local public and private agencies/organizations, and other stakeholders to coordinate resources and actions;
- availability and access of funding sources other than §319(h); and
- readiness to proceed among stakeholders and project partners.

The state links its prioritization and implementation strategy to other programs and efforts such as those listed under component #3. In establishing priorities for ground water activities, the state considers wellhead protection areas, ground water recharge

areas, and zones of significant ground water/surface water interaction, including drinking water sources.

6. The state implements all program components required by §319(b) of the Clean Water Act, and establishes strategic approaches and adaptive management to achieve and maintain water quality standards as expeditiously as practicable. The state reviews and upgrades program components as appropriate. The state program includes a mix of regulatory, non-regulatory, financial and technical assistance, as needed. In addition, the state incorporates existing baseline requirements established by other applicable federal or state laws to the extent they are relevant.

Under §319(b), state NPSM programs include all of the following components:

- (i) An identification of measures (i.e., systems of practices) that will be used to control NPS pollution, focusing on those measures that the state believes will be most effective in achieving and maintaining water quality standards. These measures may be individually identified or presented in manuals or compendiums, provided that they are specific and are related to the category or subcategory of nonpoint sources. They may also be identified as part of a watershed approach towards achieving water quality standards, whether locally, within a watershed, or statewide;
- (ii) An identification of the key programs to achieve implementation of the measures, including, as appropriate, non-regulatory or regulatory programs for enforcement, technical assistance, financial assistance, education, training, technology transfer, and demonstration projects. The state is free to decide the best approaches for solving the problems that it identifies under key component #5 above. These approaches may include one or all of the following:

Watershed or water quality-based approaches aimed at meeting water quality standards directly;

Iterative, technology-based approaches based on BMPs or measures, applied on either a categorical or site-specific basis; or

An appropriate mix of these approaches.

- (iii) A description of the processes used to coordinate and, where appropriate, integrate the various programs used to implement NPS pollution controls in the state;
- (iv) A schedule with goals, objectives, and annual milestones for implementation at the earliest practicable date: legal authorities to implement the program; available resources; and institutional relationships;
- (v) Sources of funding from federal (other than §319), state, local, and private sources;
- (vi) Federal land management programs, development projects and financial assistance programs; and
- (vii) A description of monitoring and other evaluation programs that the state will conduct to help determine short- and long-term NPS management program effectiveness.

7. The state manages and implements its NPS management program efficiently and effectively.

The state implements its program to solve its water quality problems as effectively and expeditiously as possible, and makes satisfactory progress each year in meeting program goals. To help assure that priority water quality problems are addressed cost-effectively and in a timely manner, the state includes in its program a process for identifying priority problems and/or watersheds and deploys resources in a timely fashion to address priorities, including any critical areas requiring treatment and protection within watersheds.

The state employs appropriate programmatic and financial systems that ensure §319 dollars are used efficiently and consistent with its legal obligations, and generally manages all §319 funds to maximize water quality benefits. The state ensures that §319 funds complement and leverage funds available for technical and financial assistance from other federal sources and agencies.

8. The state reviews and evaluates its NPS management plan using environmental and functional measures of success and revises its NPS management plan at least every five years.

The state establishes appropriate measures of progress in meeting programmatic and water quality goals and objectives identified in key component #1 above. The state also describes a monitoring/evaluation strategy and a schedule to measure success in meeting those goals and objectives. The state integrates monitoring and evaluation strategies with ongoing federal natural resource inventories and monitoring programs.

The state NPS management plan is reviewed and revised every five years. The revision is not necessarily a comprehensive update unless significant plan changes are warranted. Plan updates will be conducted to target the parts of the program that are out-of-date. At a minimum, this includes updating annual milestones and the schedule for program implementation, so they remain current and oriented toward achieving water quality goals.

Appendix 2: Nonpoint point source planning meetings and summary of outcomes.

Missouri Nonpoint Source Management Plan 2020-2025 Update

Partners Meeting #1

10/25/18

Attendees: Scott Hamilton (USFWS), Larry Lawson (DHSS – Environmental Epidemiology), Chris Riggert (MDC – Fisheries), Steve Westin (MDC – Forestry), Nate Muenks (MDC – Wildlife), Kyra Moore (MoDNR – Director’s Office), Hannah Humphrey (MoDNR – FAC), Tim Rielly (MoDNR – DEQ), Mariah Morrison (MDNR – Land Reclamation), Ken Tomlin (MoDNR – PDWB), John Hoke (MoDNR – WPP/WPS), Mike Kruse (MoDNR – WPP/WPS/TMDLs), Stacia Bax (MoDNR – WPP), John Horton (MoDNR – WRC), Charlie DuCharme (MoDNR – WRC), Colleen Meredith (MoDNR – SWCP), John Johnson (MoDNR – SWCP/319), Andrea Mayus (MoDNR – SWCP/319), Karen Westin (MoDNR – SWCP/319), Trish Rielly (MoDNR – SWCP/319)

Handouts: Each attendee received a packet of reference information containing: printed copy of PowerPoint presentation for note taking and future reference; “Long-Term Goal” packet (including mid-term and short-term goals); copy of the “2016 Section 303(d) Listed Waters”; a summary of the 2018 Section 303(d) list; a chart on “Aquatic Life and Recreational Use Impairments on the 2016 Impaired List”; “Appendix 8: 9-Elements of Watershed-Based Plans (WBPs)”; “HUC 8 Watershed Planning Priority”; “Priority Watersheds for Watershed Planning”; “Status of Watershed-Based Plans”; “Priority Watersheds for the Implementation of Watershed-Based Plans”; SWCP Cost Share Practices – BMP Mode of Action and Pollutants Addressed; National and State Outstanding Resource Waters; “Organizational Involvement for NPS Related Program Implementation, Administration and Facilitation”; “Success Stories about Restoring Water Bodies Impaired by Nonpoint Source Pollution; and maps of “State and National Outstanding Resource Waters” and “Priority Tier 1 Watersheds for Watershed Planning.”

The purpose of this meeting was to provide an overview of the §319 NPS program, purpose, requirements, eligible projects, etc. During the presentation, several examples of potential partnerships with various agencies were provided. In the second half of the meeting, the 2015-2019 MNPSMP goals and objectives were reviewed within small breakout groups. Each group provided their comments regarding the long-term, mid-term and short-term goals. Below is a summary of the main and reoccurring comments:

- There needs to be more hierarchy within the goals and objectives so that achievement of short-term goals leads to achievement of mid-term goals, which leads to achievement of the long-term goals.
- Goals need to be more specific (action oriented) and realistic.
- Prioritization of restoration/protection needs should be explicit, with a concomitant prioritization process.
- Be reflective of state needs.

Missouri Nonpoint Source Management Plan 2020-2025 Update
Partners Meeting #2
1/28/19

Meeting attendees: Chris Riggert (MDC – Fisheries), Rebecca O’Hearn (MDC - EHU), Brett Landwer (MDC), Brian Williams (MoDOT), Steve Hefner (USDA-NRCS), Ken Tomlin (MoDNR-PDWB), Larry Lehmon (MoDNR-LRP), Austin Rehagen (MoDNR-LRP), Joan Doerhoff (MoDNR-FAC), Mike Kruse (MoDNR-WPP-WPS), Bryan Hopkins (MoDNR-WRC), Tim Rielly (MoDNR-DEQ), Kurt Boeckmann (MoDNR-WRC), Colleen Meredith (MoDNR – SWCP), Andrea Mayus (MoDNR – SWCP/319), Karen Westin (MoDNR – SWCP/319), Trish Rielly (MoDNR – SWCP/319)

In response to comments received during the first partners meeting, §319 NPS staff revised the goals and objectives. The goals of the second partners meeting were to review and discuss the revised MNPSMP goals and objectives as a group, and discuss ways to improve partnerships.

Meeting participants were provided digital copies of the revised MNPSMP goals and objectives prior to the meeting. At the meeting, the attendees were divided into four groups to review and discuss their comments with the group. Below is a list of the main comments for each goal.

Goal 1 – Leveraging and Collaboration

- Select a point person for each of these objectives:
 - Send each point person the appropriate objective so they can review it for completeness and correctness, and
 - Use each point person to improve communication and coordination between agencies.
- Background for Goal 1 should include more specific information

Add columns for: # of partners expected at meetings, and expected outcome of meetings.

Goal 2 – Monitoring and Assessment

- Clearly define monitoring and assessment,
- This goal is easier to track because data are “true beans” (i.e., easily and accurately counted and describes a direct and accurate representation of the work accomplished), and
- Partners should meet twice a year to track what everyone is doing.

Goal 3 –

- Maybe change the Goal name to Setting Priorities or Prioritization.
- It was noted that the Goal 3 objectives were very similar to those for Goal 4, which seems redundant; maybe revise language in Goal 3 to better describe prioritization processes and
- Throughout the objectives for Goal 3, the word “support” is used but it is unclear how “support” helps achieve the Goal; indeed, it was unclear to some attendees how these objectives even help achieve the Goal of prioritization
- Potentially address the need to affect better coordination between all the different agencies/programs to do more optimal and effective strategic planning
- All agencies/programs should put their priority geographies on a GIS layer and they should all be kept somewhere like the old CARES so that NPS work could be optimized by finding overlap of those priority areas; metadata should include factors used in prioritization

- ADD an objective to identify critical areas where monitoring/implementation are needed even if no impairment, WBP, or interested local groups (i.e. areas difficult to address through regular channels); might be great opportunities for interagency collaboration/coordination
- How are priorities determined within priority areas?

Goal 4 – Implementation of Restoration and Protection Projects

- The goal seemed similar to goal 3.

Goal 5 – Public Engagement

- Need an objective for outreach to get more WBPs written, which often requires specific engagement to get it done
- Present at a conference about how to do watershed-based planning and get §319 NPS grant funding (e.g., Missouri Natural Resource Conference)
- Current objectives describe what §319 NPS Program does for engagement, but we should add objectives to capture what others are doing (find the low hanging fruit)
 - MoDNR capture: SWCP brochures and outreach, State Parks naturalist programs, §319 NPS participation in FAC presentations

Appendix 3: State, federal and local partner information.

The list below includes partners that are currently collaborating or have collaborated in the past on revisions to the Missouri Nonpoint Source Management Plan (MNPSMP). An important goal of the plan is to continue or initiate partnerships whenever possible to maximize reductions in water quality impacts caused by nonpoint source (NPS) pollution.

State Partner Organizations

Missouri Department of Agriculture (MDA) (<http://agriculture.mo.gov/>)

The MDA sets state agriculture policy and assists farmers throughout the state. MDA's primary mission is to serve, promote, and protect the agricultural producers, processors, and consumers of Missouri's food, fuel, and fiber products. Links between MDA and the NPS Program include the control and proper application of pesticides, dead animal disposal, and loans for animal waste handling.

MDA responds to reports of dead commercial livestock that have not been properly disposed of and may affect water quality. The Animal Waste Treatment System Loan Program offered by MDA through an agreement with the Department's Clean Water State Revolving Fund, finances animal waste treatment systems that do not require a permit. These loans are offered at rates below conventional interest rates for independent livestock and poultry producers. MDA's pesticide recertification program helps prevent contamination of water bodies by pesticides. The MDA's focus on NPS includes pesticide labels, waste disposal, groundwater protection, endangered species, and integrated pest management. The Department is currently implementing a general permit for point source discharges resulting from the application of pesticides.

Missouri Department of Conservation (MDC) (<http://mdc.mo.gov/>)

The MDC partners with the Department to support Missouri Stream Team efforts, collaborate on fish kills, and promote best management practices in order to protect watersheds. There is also a cooperative effort between these agencies to develop a Missouri-specific habitat index. This index will be beneficial to the Department in its efforts to develop tiered aquatic life uses, Use Attainability Analysis (UAA) determinations, and §303(d) impaired waters assessments. The MDC will be a key partner in identifying and implementing projects that specifically address NPS sources impacting aquatic life. For example, numerous low water crossings, undersized culverts, and headwater impoundments reduce the availability of habitat quality for Missouri's sensitive aquatic life species. The MDC has also developed watershed inventories and assessments that provide natural resource-related information about Missouri's primary watersheds, especially information pertaining to management of aquatic resources. Watershed inventory and assessment reports are available at: <https://mdc.mo.gov/community/watershed-inventory>. In addition, MDC's annual reports include many NPS related accomplishments posted annually in the January issue of the Missouri Conservationist (<https://mdc.mo.gov/magazines/missouri-conservationist>).

Missouri Stream Teams/Volunteer Water Quality Monitoring (VWQM) Program

(<http://www.mostreamteam.org/>)

The Missouri Stream Team network consists of citizens who are concerned about Missouri streams and administered by the Department and MDC. The organization offers free membership

to any interested citizen, family, or organization and strives to assist in the proper management of these waterways. The Missouri Stream Team program helps organize interested citizens to address stream problems at the local level. Members learn to monitor water quality at a geographic scale beyond what government agencies can do. They also work together to clean waterways, plant trees, stabilize stream banks, and improve fish and wildlife habitats in or near streams.

The VWQM program has trained approximately 7,000 volunteers since the program was launched in 1993. Currently, the program averages approximately 440 volunteers attending workshops annually and at times receives support from the Missouri §319 NPS Program. More detailed information about Missouri Stream Team and VWQM programs can be found at: <http://www.mostreamteam.org/>.

The Stream Team's volunteer monitoring will continue to play a valuable role in Missouri's overall NPSMP. The Missouri §319 NPS Program will rely on observations from the Stream Team volunteer network to provide indicators of restoration and protection success.

Missouri Department of Transportation (MoDOT) (<http://www.modot.org/>)

The MoDOT recognizes the richness of our state's diverse environment and aspires to balance Missouri's transportation needs with environmental sensitivity and responsibility. To that end, MoDOT seeks out new and innovative ideas for more environmentally-friendly and cost-effective projects. Links to these topics are located at the top of the page (<https://www.modot.org/innovations-challenge>).

In 1969, the U.S. Congress passed the National Environmental Policy Act (NEPA) in response to increasing public concern about the state of the environment. NEPA establishes a national policy to protect the environment, which includes the assessment of potential environmental impacts of all major federal actions. Any project that receives federal funds or permits falls under the umbrella of NEPA, including MoDOT projects that are administered by the Federal Highway Administration and other federal transportation agencies.

In addition to NEPA, MoDOT is also mandated to consider the potential impacts of its federally funded or permitted projects on the cultural environment. In order to comply with federal mandates such as NEPA and the National Historic Preservation Act of 1966, MoDOT employs a staff of highly-qualified environmental and historic preservation professionals. This staff includes experts in the areas of archeology, architectural history, bridge history, air quality, community impacts, farmland protection, floodplain management, NEPA compliance, noise analysis, public lands, solid and hazardous wastes, threatened and endangered species, water quality, and wetland and stream protection.

MoDOT has a history of supporting §319 NPS projects such as signage and road right-of-way issues. MoDOT supports NPS efforts by employing conservation practices to avoid, minimize, or mitigate impacts to wetlands, threatened and endangered species, and critical habitats.

Department of Health and Senior Services (DHSS) (<http://www.dhss.mo.gov/>)

The mission of the DHSS is to protect and promote quality of life and health for all Missouri citizens. The DHSS monitors adverse health effects and prepares population risk assessments regarding environmental hazards. There is particular cooperation and partnership regarding NPS issues relating to private drinking water, recreational water quality, on-site sewage and other wastewater systems, and fish consumption advisories.

DHSS maintains statutory authority over on-site disposal systems to develop a state standard for location, size of sewage tanks, and length of lateral lines based on percolation rates or soil properties, construction, and installation and operation of on-site sewage disposal systems. Regular meetings take place among the Department and DHSS staff on a variety of NPS issues such as on-site waste, fish toxicity, and various grant projects.

Missouri Department of Natural Resources (MoDNR) (<http://dnr.mo.gov/>)

The MoDNR, or the Department, protects, preserves, and enhances Missouri's natural and cultural resources. The Department helps develop mineral resources in an environmentally safe manner, protects Missouri's land, air and water resources, and works to preserve the state's cultural and natural heritage through state parks, state historic sites, and the state historic preservation office.

Soil and Water Conservation Program (SWCP)

(<https://dnr.mo.gov/land-geology/soil-water-conservation>)

In 2014, the Department moved the SWCP under the Division of Environmental Quality (DEQ), and the Missouri NPSM program became a program within the SWCP, although each operates under their respective funding authorities. The SWCP provides staff support for the Soil and Water Districts Commission and supports all 114 county Soil and Water Conservation Districts (SWCDs). Both the §319 program and the SWCP use voluntary approaches for reducing NPS pollution. Half of the proceeds of a one-tenth of one percent Parks, Soils and Water sales tax in Missouri support SWCP activities, while the other half maintains the state's park system. A minimum of 60 percent of the SWCP portion of the tax goes directly to landowners for soil and water quality conservation practices through a cost-share program (http://dnr.mo.gov/env/swcp/service/swcp_cs.htm). The SWCP is the state's primary program for addressing NPS pollution on agricultural lands. From 1984-2019 over \$772 million was provided to landowners for projects to reduce soil erosion and protect water quality.

§319 NPS Program

(<https://dnr.mo.gov/water/what-were-doing/nonpoint-source-pollution-section-319>)

This watershed-based program is authorized and funded under §319 of the Clean Water Act. The program uses an integrated approach that develops and coordinates NPS activities with federal, state, local and private sector entities for outreach, information, education, demonstration practices, technical assistance, and implementation assistance. The SWCP Director administers the NPS Program and ensures that a sustainable watershed-based approach is used to address NPS issues. The Department funds approximately four to 20 NPS projects annually, depending on available funding and funding requests. Projects often complement efforts of partners, such as the U.S. Department of Agriculture (USDA) - Natural Resource Conservation Service (NRCS) and MDC, and the implementation of

conservation practices by the SWCP by providing valuable components not eligible for other funding sources in priority watersheds. The program may also add incentives for installing practices in critical areas or for installing highly effective, but less conventional, conservation practices. The NPS program plays a key role in supporting the statewide watershed planning efforts through watershed outreach, information, education, development of WBPs, pass-through funding for conservation practice implementation, and funding for monitoring and assessment.

Water Protection Program (WPP)

(<https://dnr.mo.gov/water>)

The WPP administers rules promulgated by the Missouri Clean Water Commission under Missouri's Clean Water Law. The following programs are implemented by the WPP and have important roles in remediating and preventing NPS pollution.

Water Quality Standards (WQS): The Missouri WQS are reviewed and modified every three years. WQS provide the numeric and narrative criteria that are used to determine the attainment of water quality objectives. The antidegradation rule may require actions to maintain a level of water quality above those mandated by criteria. The attainment frequency of WQS is used in identifying and characterizing waters of the state for the §303(d) list and §305(b) report. For more information about the WQS, please see the following links: <http://dnr.mo.gov/env/wpp/wqstandards/index.html> and <http://www.sos.mo.gov/adrules/csr/current/10csr/10c20-7a.pdf>.

State Revolving Fund (SRF): This program provides low interest loans to public entities for drinking water and wastewater infrastructure; storm water-related projects that benefit water quality; and green infrastructure. The program is a cooperative effort of the Department, the U.S. Environmental Protection Agency (EPA), the Clean Water Commission, and the Environmental Improvement and Energy Resources Authority (EIERA) (<https://eiera.mo.gov/>).

Stormwater Permits: [National](#) and [state](#) stormwater regulations require certain communities to obtain a Municipal Separate Storm Sewer Systems (MS4) permit. MS4 Communities (Appendix 4) that are working to reduce NPS pollution above and beyond the requirements of their permits may be eligible for §319 funding. A guide to planning in Green Infrastructure can be found at: <https://dnr.mo.gov/document-search/introduction-green-infrastructure>.

Public Drinking Water Branch (PDWB)

(<https://dnr.mo.gov/water/how-water-water-we-drink>)

The PDWB supervises the design, construction, and maintenance of public water systems. The PDWB supports the NPSMP through water quality monitoring of public drinking water supplies and through administration of Missouri's source water protection program. The program promotes development and implementation of local source water protection plans to enhance protective measures around raw drinking sources. The program also directs financial assistance, when available, toward groundwater protection activities and local source water protection plan development.

In 2012, a pilot project entitled “Enabling Source Water Protection: Aligning State Land Use and Water Protection Programs” was completed with financial assistance from the EPA, The Trust for Public Land, and the Smart Growth Leadership Institute, in partnership with the Association of State Drinking Water Administrators and River Network. With assistance from the national team, Missouri developed a guidance document to assist the Department in better integrating authorized Clean Water Act and Safe Drinking Water Act tools (among others) to protect water quality across the state. Based on success stories and innovative strategies employed by other primacy organizations across the country, the document provides a broad range of flexible approaches to improve coordination, collaboration, and effectiveness of water quality programs within the state.

The PDWB is also responsible for producing preliminary source water assessment reports for public drinking water sources across Missouri. The reports provide general risk assessments for public drinking water sources and assist water suppliers with identifying and prioritizing protection activities.

Continuing Planning Process (CPP)

The CPP is a document that describes the Department’s water quality management planning activities and processes, and provides links to additional sources of information and references (e.g., technical guidance documents, memorandums of agreement, and legislative updates). The NPSMP is part of Missouri’s CPP. Section 303(e) of the federal Clean Water Act (CWA) requires each state to develop and maintain an EPA-accepted CPP. Upon state approval of changes to their CPP, the Department is required to submit the revised CPP to the U.S. EPA Region 7 administrator for review. While the Missouri Clean Water Commission approves the CPP document, the EPA Region 7 administrator determines if it is consistent with the CWA. Missouri’s CPP for 1973 -2014 has been reviewed and accepted by EPA to be consistent with the CWA. The updates to the 2019 can be made available upon request..

Missouri Geological Survey (MGS)

(<https://dnr.mo.gov/land-geology>)

The MGS is responsible for determining positions, formations, arrangements, composition, and utilization of groundwater and surface water. The Geological Survey Program within MGS has developed an Aquifer Classification System, which categorizes aquifers into areas according to their susceptibility to contamination. The program’s well drilling regulations assist with reducing NPS by specifying setback distances from pollution or contamination sources, such as chemical and fertilizer storage areas, manure storage areas, and septic tanks. This program has assisted with §319 NPS projects as a cooperating partner where pre-law, lead-mine exploration holes were plugged to reduce NPS lead contamination in ground water.

Water Resources Center (WRC)

(<https://dnr.mo.gov/about-us/missouri-geological-survey/water-resources-center>)

The WRC is also part of MGS and provides technical assistance with stream erosion, deposition, flooding, drought and flooding impacts, location and health of wetland resources, location of contributing areas for springs and wells, groundwater level monitoring in

association with the U.S. Geological Survey , and additional studies used to determine water movement and predictions of ground and surface water flow. Data are used to support monitoring of NPS water quality projects. The WRC is currently authoring a statewide Wetlands Program Plan. The five-year plan tentatively includes monitoring, assessment and implementation strategies that will add effective, high quality support to NPS efforts.

In addition to wetland planning and development, WRC provides funds for water monitoring and gaging stations through U.S. Geological Survey contracts.

Land Reclamation Program (LRP)

(<https://dnr.mo.gov/about-us/missouri-geological-survey/land-reclamation-program>)

The U.S. Surface Mining Control and Reclamation Act of 1977 (SMCRA) regulates surface coal mining operations and provides funding to states for reclaiming abandoned coal mine lands that were disturbed prior to August 3, 1977. The LRP's Abandoned Mine Land Section utilizes the funding to reclaim sites that were mined for coal prior to 1977 in order to mitigate NPS impacts. Priority for reclamation of past coal-mined lands is based on classification of: 1) the protection of public health and safety from extreme danger (e.g., high walls and open shafts), 2) the protection of public health and safety not constituting extreme danger, and 3) restoration of land and water previously degraded. Department staff oversee the reclamation projects and provide expertise in soils, revegetation, and water quality. Management practices are designed and implemented to control and mitigate point source and NPS related surface and subsurface flows.

University of Missouri (MU) (<http://missouri.edu/>)

Water quality on the state and regional level is a major focus area of MU's College of Agriculture, Food and Natural Resources (CAFNR) in Columbia, Missouri.. Emphasis on educational programs, information, and demonstration promotes water quality and continued learning throughout the state. MU partners with the Department and NRCS to periodically present information for current and upcoming water quality professionals. Historically, MU Extension (<http://extension.missouri.edu/>) has been a strong partner with the Department's watershed-based efforts and §319 NPS program. Through subgrants, joint funding agreements, and university contributions, MU Extension has played a key role in watershed outreach, education, monitoring, and planning. The following are some specific programs at MU that address NPS issues:

Center for Watershed Management and Water Quality (<https://snr.missouri.edu/water-quality/>) The Center for Watershed Management and Water Quality is located within the University of Missouri's CAFNR and its mission includes developing sustainable solutions to contemporary watershed management and water quantity and quality problems to attain maximum benefits of Missouri's waters and enhance the environmental, social and economic status of the state.

Soil Health Assessment Center (SHAC) (<https://cafnr.missouri.edu/soil-health/>)

The SHAC originated in 1985 when the Department, in cooperation with NRCS, funded an in-state soil lab to aid the ongoing Missouri Soil Survey. The Department provided the initial

funding to set up the Soil Characterization Lab in the CAFNR and continued financial support until the Missouri Soil Survey was completed in 2008. The laboratory has changed locations several times over the years; however, in 2015, the lab returned to the CAFNR and moved into a newly remodeled facility at the MU's South Farm Research Center (<https://southfarm.missouri.edu/>). Soil characterization deals with the physical and chemical properties of soil, but does not typically address the biological component. However, since about 2010, interest in the biological component of soil has increased and this more holistic approach to soil health is now included in several new soil test analyses. Since 2016, the SHAC has been conducting soil health analyses in conjunction with SWCP cover crop practice.

Lakes of Missouri Volunteer Program (LMVP) (<http://www.lmvp.org/>)

The MU-CAFNR collaborates with the Department in implementing the LMVP. The goals of the LMVP are to: 1) determine the current water quality based on productivity or trophic state of Missouri's lakes, 2) monitor for changes in water quality over time, and 3) educate the public about lake ecology and water quality issues. A cooperative agreement with MU streamlines the lakes activities required by §314 and §319(h) of the Clean Water Act and §303(d) processes for lake water quality monitoring and assessments. The Department relies on MU's lakes monitoring data to meet §303(d) reporting requirements and for the development of nutrient criteria. This cooperation benefit both parties by prioritizing monitoring sites to better meet both parties' needs and monitoring strategies.

Statewide Lake Assessment Project (SLAP)

(<http://www.lmvp.org/Waterline/fall2004/slap.htm>)

The Statewide Lake Assessment Project began in 1978 and has monitored lakes every year since 1989. This project has produced one of the most complete, long-term studies of lakes in the nation. The data generated through SLAP helps the state meet Clean Water Act requirements for monitoring lake water quality; but more importantly, this information help Missouri agencies identify water quality problems and better manage Missouri's lakes. Section 319 funds help support this project. SLAP data is utilized by the Department for the §305(b) report and §303(d) list.

Missouri State University (<http://projectwet.missouristate.edu/>)

Missouri State University currently helps support the Missouri Project Water Education for Teachers (Project WET). Project WET is an environmental education program for teachers and other educators working with children from Kindergarten through Grade 12. Interdisciplinary instructional activities include workshops and in-service programs for teachers, natural resource professionals, parks, and nature centers. Funding is often provided under an implementation subgrant agreement that supports the educational and outreach requirements of a §319 NPS project. Project WET is a statewide educational program; however, the University plays an important role in southwest Missouri water quality projects by providing monitoring and modeling assistance.

Ozark Environmental Water Resource Institute (OEWRI) (<https://oewri.missouristate.edu/>).

Missouri State University houses the OEWRI, which provides data collection, trend analysis, and results interpretation in southwest Missouri. Through collaboration, contracts, and grants,

OEWRI also provides advice and technical support to watershed groups, local communities, and private businesses to help plan and implement water quality monitoring programs. The institute maintains a website exhibiting environmental resources including research, partnerships, projects and services, publications and annual reports.

Missouri Association of Councils of Government (MACOG) (<http://www.macogonline.org/>)

The MACOG is a statewide organization representing Missouri's 19 regional planning commissions and councils of governments. These regional councils are engaged in a myriad of activities, including environmental issues. The NPS program has partnered with several regional councils and provided various grant funding to support cooperative water quality related projects. MACOG's focus is on planning, and NPS activities have been on green infrastructure, assessing on-site waste management water quality issues, and conducting feasibility studies and designs that help to bring these on-site systems online with existing treatment plants. Regional councils and commissions are engaged in a myriad of activities, including:

- Economic and community development
- Housing initiatives
- Safety and security
- Transportation planning
- Environmental issues
- Quality-of-life issues

The NPS program has partnered with several regional councils and commissions and provided various grant funding to support cooperative water quality related projects.

Federal Partner Organizations

U.S Environmental Protection Agency (EPA) (<http://www.epa.gov/>)

The EPA is the lead federal agency for environmental protection and an essential partner in the states NPSM plans. The Office of Wetlands, Oceans and Watersheds (OWOW) (<http://water.epa.gov/index.cfm>) serves as the national program manager for EPA's §319 NPS Management Program efforts and provides NPS program guidance that each state is required to follow under §319 of the CWA (<https://www.epa.gov/nps>). The EPA provides funding for NPS through the §319 Grant. The EPA Region 7 (<http://www2.epa.gov/aboutepa/epa-region-7-midwest>) serves as a primary partner in Missouri's watershed protection and restoration efforts and is responsible for primary oversight of Missouri's NPS Program. A variety of watershed resources and opportunities are provided to help citizens and organizations improve or protect water quality in their communities, including technical assistance and funding opportunities.

U.S. Department of Agriculture (USDA) (<http://www.usda.gov/wps/portal/usda/usdahome>)

Natural Resources Conservation Service (NRCS)

(<https://www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/>)

For over 80 years, the NRCS has worked with landowners to maintain healthy and productive landscapes. NRCS delivers technical assistance that is based on science and suited to a customer's specific needs. Through its national framework, the NRCS works extensively with private landowners, especially farmers and ranchers, to implement best management practices for the wise use of natural resources. Both technical and financial programs that can either leave

lands in agricultural production or place land in conservation easements are offered to the public. Examples of these voluntary programs include the Conservation Technical Assistance Program, Environmental Quality Incentives Program, Conservation Stewardship Program, Regional Conservation Partnership Program, and the Agricultural Conservation Easement Program.

With their multiple components and programs, USDA is a critical partner for substantial implementation of Missouri's NPSM program. During this five-year planning period the Department will continue to engage USDA to find common goals and make mutual commitments to improve water quality on a prioritized watershed basis. This partnership is a good example of how agencies can assist each other and leverage funding for mutual priorities. As environmental impacts become apparent and data is collected through these collaborative efforts, load reduction and other progress reporting will be provided through EPA's Grants Reporting and Tracking System (GRTS) and the annual program progress report. Partnering with these efforts is another priority consideration for the Department.

U.S. Forest Service (USFS)

(<http://www.fs.fed.us/managing-land/natural-resources>)

The USDA-USFS promotes the sustainability of ecosystems and provides public service through conservation leadership. In 1986, the signing of the Record of Decision for the environmental impact statement of the Mark Twain National Forest (<http://www.fs.usda.gov/mtnf>) established standards and guidelines for protecting national forests in Missouri. Specific NPS related language regarding USFS management is included in 36 CFR section 219.23 - forest planning shall provide compliance with requirements of the CWA and evaluation of existing or potential watershed conditions that will influence soil productivity, water yield, water pollution or hazardous conditions; and section 219.27 – “conserve soil and water resources...”, “provide for adequate fish and wildlife habitat to maintain viable populations...”, and “manage riparian areas to avoid detrimental water temperature and chemical composition changes, blockages of water course or deposits of sediment.” The USFS is an active NPS partner with watershed planning, water quality monitoring and §319 NPS projects partnering.

U.S. Department of Interior

U.S. Geological Survey (USGS), Water Resources Division (<http://water.usgs.gov/>)

The mission of the USGS is to provide reliable, impartial and timely information that is needed to understand the Nation's water resources. Consistent with the USGS mission, the USGS Water Science Center is available to assist in the collecting and interpreting groundwater and surface water data. The USGS uses hydrologic data and other data in research and hydrologic studies, which describes the quantity, quality, and location of Missouri's water resources. The Department partners with USGS to fund sites for NPS ambient water quality monitoring and groundwater levels throughout the state. The USGS also funds national water quality programs through congressional appropriations such as the National Stream Quality Accounting Network (NASQAN) (<https://nrtwq.usgs.gov/nwqn/#/>), which provides data for three water quality monitoring stations on the Missouri and Mississippi rivers. USGS is a strong partner in Missouri's water quality initiatives with monitoring, modeling, assessments, funding, technical assistance and watershed prioritization.

U.S. Fish and Wildlife Service (USFWS)

(<http://www.fws.gov/>)

The USFWS administers several programs that are important to the NPSM Plan. The Partners for Fish and Wildlife Program was established by Public Law 109-204 and focuses efforts in three areas: wetland restoration, grassland restoration, and stream and riparian restoration. This program works cooperatively with landowners to enhance privately-owned land for Federal Trust Species. Another companion program to the Partners for Fish and Wildlife Program is the Challenge Cost Share Program (<http://www.fws.gov/policy/055fw6.html>), which allows the USFWS to provide matching funds for projects that support the management, restoration and protection of natural resources on wildlife refuges, fish hatcheries, research facilities and private lands. The USFWS is also involved in restoration work in both the Tri-State Mining District and South East Mining District, creating habitat on thousands of acres of formerly mined areas. The Service manages many aquatic endangered species and reviews projects to ensure the preservation of those species. These programs may provide opportunities to leverage efforts for protecting high quality surface waters or remediating impaired aquatic life uses.

The NPSM program's goal to improve aquatic life use, an effective indicator of water quality changes, is consistent with USFWS goals. Consequently, the Department anticipates continued partnership with this agency.

U.S. Army

U.S. Army Corps of Engineers (USACE)

(<https://www.usace.army.mil/>)

The USACE is an engineer formation of the United States Army that has three primary mission areas: engineer regiment, military construction, and civil works. USACE civil works consists of three congressionally authorized business lines: navigation, flood and storm damage protection, and aquatic ecosystem restoration. Civil works is also tasked with administering the Clean Water Act Section 404 program, recreation, hydropower, and water supply at USACE flood control reservoirs, and environmental infrastructure.

Missouri falls within five USACE district jurisdictions⁶⁷ (Kansas City, St. Louis, Rock Island, Memphis, and Little Rock). Where the USACE feasibility studies, environmental protection and restoration, and other projects overlap with the NPSM program's goals, there may be opportunities for partnership and collaboration in addressing both flood and NPS pollution concerns. Where possible, the Department anticipates continued partnership with this agency.

⁶⁷ https://www.mvm.usace.army.mil/portals/51/docs/regulatory/boundary%20maps/missouri_regulatory_offices.pdf

**Organizational Involvement for Nonpoint Source Related Program Implementation,
Administration and Facilitation**

NPS Partners and Organizations	IE	FA	TA	TT	E	M	P	A
Missouri Department of Agriculture	x	x	x	x				x
Missouri Department of Conservation	x	x	x	x	x	x	x	x
Missouri Department of Transportation	x	x	x	x			x	
Missouri Department of Health and Senior Services								
Missouri Department of Natural Resources	x	x	x	x	x	x	x	x
Soil and Water Conservation Program	x	x	x	x		x	x	
§319 NPS Program	x	x	x	x		x	x	
Soil and Water Conservation Districts	x	x	x	x				
Water Protection Program	x	x	x	x	x	x	x	x
Stormwater Permits	x		x	x			x	
401 Water Quality Certification	x		x	x			x	
Public Drinking Water Program	x	x	x		x	x	x	x
Financial Assistance Center	x	x	x				x	
Missouri Geological Survey	x		x	x		x		x
Water Resources Program	x	x	x			x		x
Land Reclamation Program		x	x	x	x	x		
Region Offices	x		x				x	x
University of Missouri	x	x	x	x		x		x
County Extension Offices	x		x					
Missouri State University	x		x	x		x		x
Missouri Association of Councils and Governments	x		x					
U.S. Environmental Protection Agency	x	x	x	x	x	x	x	x
USDA, Natural Resources Conservation Service	x	x	x	x				x
USDA, U.S. Forest Service								
DOI, U.S. Fish and Wildlife Service	x	x	x	x		x	x	x
Resource Conservation and Development Councils	x	x	x	x				
U.S. Army Corps of Engineers	x	x	x	x	x	x	x	x
U.S. Geological Survey	x	x	x	x		x	x	x
<u>Key</u> <i>IE – Information and Education</i> <i>FA – Financial Assistance</i> <i>TA – Technical Assistance</i> <i>TT – Technology Transfer</i> <i>E – Enforcement</i> <i>P – Policy and Planning</i> <i>A – Assessment</i> <i>M – Monitoring</i>								

Local Partner Agencies/Organizations

The following table provides a breakdown of the types of assistance these partner agencies/organizations may provide in the five-year plan period. These lists do not constitute commitment from these organizations but only show the potential efforts that could be attained through negotiated partnership Memorandum of Agreements or other forms of agreements.

These organizations can play a significant role in addressing NPS issues through their local members and chapter organizations. Some of these agencies and organizations that have been active in sponsoring §319 NPS funded projects since 2003 and may continue to play a role in the five-year planning period include (Note: This is not a comprehensive list):

- | | |
|--|---|
| • Belews Creek Watershed Partnership | • National Audubon Society |
| • Bryant Watershed | • Ozarks Resource Center |
| • Deer Creek Alliance | • Region Wise with St. Louis University |
| • Elk River Watershed Improvement Group | • River des Peres Watershed Coalition |
| • Greenway Network | • Roaring River Parks Alliance |
| • James River Basin Partnership | • Shoal Creek Watershed Improvement Group |
| • Lake Area Industries, Inc. | • Show-Me Clean Streams |
| • Lake of the Ozarks Watershed Alliance | • South Grand River Watershed Alliance |
| • Little Blue River Watershed Coalition | • St. Louis Earth Day |
| • Missouri Botanical Garden | • St. Louis Operation Brightside |
| • Missouri Coalition for the Environment | • Table Rock Lake Water Quality, Inc. |
| • Missouri Forestry Products Association | • Upper White River Basin Partnership |
| • Missouri Rivers Community Network | • Watershed Committee of the Ozarks |
| • Missouri Stream Team Watershed Coalition | • Wildcat Glades Conservation |
| • MO-KAN Development Inc. | • Higher Educational Institutions |

Local Governments and Organizations

Numerous local governments or organizations play a significant role in addressing NPS issues through their local planning efforts, ordinance development, and through projects funded with grants and loans. Some of these agencies and organizations that have been active in supporting §319 NPS efforts include:

- | | |
|--|---|
| • County Health Departments | • Regional Planning Commissions |
| • St. Louis Metropolitan Sewer Districts | • Local Councils of Governments |
| • Public Drinking Water Districts | • Farm Bureau |
| • City Stormwater Districts/Divisions | • Soil and Water Conservation Districts |
| • City and County Governments | |

Industry Partners

Numerous industry partners/organizations can play a significant role in addressing NPS issues through providing input at stakeholder meetings/forums, adapting BMPs, etc. Some of these industries that have been active directly through consulting, forums, collaboration, or indirectly through §319 NPS funded projects include:

- Ameren MO
- Environmental Architects
- Environmental Consultants
(i.e., Barr Engineering, Geosyntec)
- Fertilizer and Seed companies
- Forestry Product Associations
- Homebuilder Associations
- Landscape companies
- Missouri Corn Growers and Soybean Association
- Missouri Public Utility Alliance

Mechanisms for NPS Program Collaboration and Partnerships

Following is a list of the coordination and collaboration meetings held (i.e., USDA technical meetings, committees, forums, advisory committees, Missouri watershed planning summits, conferences):

- Water Protection Forum
- Association of Clean Water Administration NPS Workgroup
- Governor's Conference on Natural Resources
- Watershed-Based Plan Summits/Workshops
- USDA State Technical Committee
- Nutrient Criteria Committee
- EPA Region 7 Four-State meetings
- Show-Me Chapter for the Soil and Water Conservation Society
- Annual Soil and Water Districts Conference
- Missouri Watershed Planning Coordinators meetings
- Participation and presentations at meetings and conferences such as:
 - Clean Water Commission
 - Soil and Water Districts Commission
 - Watershed Planning Meetings

Appendix 4: Missouri municipal separate storm sewer system communities.

The following table provides a list of MS4 communities based on population. Missouri has 162 MS4's and 94 total permits.

Revised April 19, 2018

Arnold	Country Club, Village of	Jasper County	O'Fallon	Sugar Creek
Ballwin ^(MSD)	Crestwood ^(MSD)	Jefferson City	Olivette ^(MSD)	Sunset Hills ^(MSD)
Battlefield	Creve Coeur ^(MSD)	Jefferson County ^(JeffCo)	Oronogo (Spring River)	Troy
Bellefontaine Neighbors ^(MSD)	Crystal City ^(JeffCo)	Jennings ^(MSD)	Overland ^(MSD)	Town And Country ^(MSD)
Bel-Nor, Village Of ^(MSD)	Dardenne Prairie	Joplin	Ozark	U.S. Medical Center for Federal Prisoners
Bel-Ridge, Village Of ^(MSD)	Dellwood ^(MSD)	Kansas City*	Pagedale ^(MSD)	Union
Belton	Des Peres ^(MSD)	Kennett	Parkville	University City ^(MSD)
Berkeley ^(MSD)	Duquesne	Kirksville	Pevely ^(JeffCo)	University of Missouri-Col ^(CoMo)
Black Jack ^(MSD)	Eureka	Kirkwood ^(MSD)	Peculiar	Valley Park ^(MSD)
Blue Springs	Ellisville ^(MSD)	Ladue ^(MSD)	Platte County	Vinita Park ^(MSD)
Bolivar	Excelsior Springs	Lake Lotawana	Pleasant Valley	Warrensburg
Boone County ^(CoMo)	Farmington	Lake St. Louis	Poplar Bluff	Warson Woods ^(MSD)
Branson	Fenton ^(MSD)	Lake Winnebago	Raymore	Washington
Breckenridge Hills ^(MSD)	Ferguson ^(MSD)	Lakeshire ^(MSD)	Raytown	Weatherby Lake
Brentwood ^(MSD)	Festus ^(JeffCo)	Lebanon	Republic	Webb City
Bridgeton ^(MSD)	Florissant ^(MSD)	Lee's Summit	Richmond Heights ^(MSD)	Webster Groves ^(MSD)
Byrnes Mill ^(JeffCo)	Fort Leonard Wood	Liberty	Riverside	Weldon Spring
Callaway County	Frontenac ^(MSD)	Manchester ^(MSD)	Riverview, Village of ^(MSD)	Wentzville
Calverton Park, Village of ^(MSD)	Fulton	Marlborough, Village of ^(MSD)	Rock Hill ^(MSD)	West Plains
Cape Girardeau City	Gladstone	Marshall	Rolla	Wildwood ^(MSD)
Cape Girardeau County	Glendale ^(MSD)	Maryland Heights ^(MSD)	Sedalia	Winchester ^(MSD)
Carl Junction	Grain Valley	Maryville	Shrewsbury ^(MSD)	Woodson Terrace ^(MSD)
Carterville	Grandview	Mexico	Sikeston	

Carthage	Green Park ^(MSD)	MoDOT	Smithville	162 Total MS4s
Cass County	Greene County	Moberly	Springfield*	94 Total Permits
Charlack ^(MSD)	Greenwood	Moline Acres ^(MSD)	St. Charles	
Chesterfield ^(MSD)	Hanley Hills, Village Of ^(MSD)	Neosho	St. Ann ^(MSD)	
Christian County	Hannibal	Newton County	St. Charles County	
Clarkson Valley ^(MSD)	Harrisonville	Nixa	St. John ^(MSD)	
Claycomo, Village of	Hazelwood ^(MSD)	Normandy ^(MSD)	St. Joseph	
Clayton ^(MSD)	Herculaneum ^(JeffCo)	North Kansas City	St. Louis (MSD) ^(MSD)	
Cole County	Holts Summit	Northwoods ^(MSD)	St. Louis County ^(MSD)	
Columbia ^(CoMo)	Independence*	Norwood Court, Town of ^(MSD)	St. Martins	
Cool Valley ^(MSD)	Jackson, City of	Oak Grove	St. Peters	
Cottleville	Jackson County (Salem E)	Oakland ^(MSD)	Strafford	

Newly designated 10K+ communities based on 2010 Census; Newly designated communities <10K based on 2010 Census and redefined Urbanized Areas.

*Phase I communities with populations of 100,000+ at time of 1990 census. (MSD) = St. Louis Metropolitan Sewer District Co-Permittees (Total = 61); (JeffCo) Jefferson County Co-Permittees (6); (CoMo) Columbia, MU, Boone County Co-Permittees (3)

Appendix 5: Other waters rated as impaired and believed to be impaired.

The following table includes classified waters in Missouri found to be impaired, but do not qualify for §303(d) listing. This list includes waters with approved TMDLs; waters where sufficient pollution control measures have been implemented; waters believed to be impaired by pollution, but no discrete pollutants have been identified; and other waters that were not approved for §303(d) listing by the Clean Water Commission.

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
4083	Barker Creek tributary (C)	1.2	Henry	pH	Source Unknown	4A	10290108	
4083	Barker Creek tributary (C)	1.2	Henry	Sulfates	Source Unknown	4A	10290108	
1746	Big Bottom Cr. (C)	0.6	Ste. Genevieve	Ammonia, Total	Municipal Point Source Discharges	4A	7140101	
1746	Big Bottom Cr. (C)	1.5	Ste. Genevieve	Oxygen, Dissolved	Municipal Point Source Discharges	4A	7140101	
2916	Big Cr.(P)	1.8	Wayne/Iron	Cadmium	Ind./Comm. Site Stormwater Discharge,	4A	8020202	
					Permittee		8020202	
2074	Big R.(P)	111.2	Jefferson	Lead	Mill Tailings	4A	7140104	
2080	Big R. (P)	133	Jefferson/Washington	Lead	Mill Tailings	4A	7140104	
2080	Big R.(P)	81.3	Jefferson/Washington	Lead	Mine Tailings	4A	7140104	
2080	Big R. (P)	52.7	Jefferson/Washington	Sedimentation/Siltation	Mill Tailings	4A	7140104	
417	Blue R. (P)	4.4	Jackson	Chlordane in Fish Tissue	Nonpoint Source	4A	10300101	Priority
3118	Buffalo Ditch (P)	17.3	Dunklin	Oxygen, Dissolved	Source Unknown	4A	8020204	
3941	Cave Spring Br.(US)	4.4	McDonald	Nitrogen, Total	Industrial Point Source Discharge	4A	8020202	
3203	Center Cr. (P)	38	Jasper	Zinc	Mill Tailings	4A	11070207	Priority
640	Chariton R. (P)	111	Chariton/Putnam	Escherichia coli	Agriculture	4A	10280201	
3168	Chat Cr. (C)	2.1	Lawrence	Zinc	Subsurface, Hardrock, Mining	4A	11070207	Priority
1706	Coldwater Cr.(C)	13.8	St. Louis	Escherichia coli	Urban Runoff/Storm Sewers	4A	10300200	Priority
1703	Creve Coeur Cr. (C)	3.8	St. Louis	Escherichia coli	Urban Runoff/Storm Sewers	4A	10300200	Priority

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
1145	Dry Auglaize Cr. (P)	3	Laclede	Cause Unknown	Source Unknown	4B	10290109	
1145	Dry Auglaize Cr.(P)	1	Laclede	Oxygen, Dissolved	Source Unknown	4B	10290109	
811	E. Brush Cr. (C)	1.1	Moniteau	Oxygen, Dissolved	Municipal Point Source Discharges	4B	10300102	Priority
2186	Fishpot Cr.(P)	3.5	St. Louis	Escherichia coli	Urban Runoff/Storm Sewers	4A	7140102	
2168	Flat River Cr. (C)	9.4	St. Francois	Lead	Mill Tailings	4A	7140104	
2168	Flat River Cr. (C)	10	St. Francois	Lead	Mine Tailings	4A	7140104	
2168	Flat River Cr. (C)	4.7	St. Francois	Sedimentation/Siltation	Mill Tailings	4A	7140104	
2168	Flat River Cr. (C)	4.7	St. Francois	Zinc	Mill Tailings	4A	7140104	
1842	Fox Cr. (P)	7.2	St. Louis	Aquatic Macroinvertebrate Bioassessments	Source Unknown	4C	7140102	
883	Gabriel Cr.(C)	13.6	Morgan	Oxygen, Dissolved	Municipal Point Source Discharges	4B	10300103	
430	Grand R. (P)	8	Livingston/Worth	Fishes Bioassessments	Channelization	4C	10280101	
593	Grand R. (P)	56	Chariton/Livingston	Escherichia coli	Nonpoint Source	4A	10280103	Priority
593	Grand R.(P)	11.5	Chariton/Livingston	Fishes Bioassessments	Channelization	4A	10280103	Priority
1008	Hinkson Cr. (C)	6.8	Boone	Cause Unknown	Urban Runoff/Storm Sewers	4A	10300102	Priority
1007	Hinkson Cr. (P)	7.6	Boone	Cause Unknown	Urban Runoff/Storm Sewers	4A	10300102	Priority
1251	Honey Cr. (C)	8.5	Henry	Sulfates	Coal Mining	4A	10290108	
1946	Indian Cr. (P)	1.9	Washington	Lead	Mill Tailings	4A	7140102	
2681	Jacks Fk.(P)	7.5	Shannon/Texas	Escherichia coli	Municipal Point Source Discharges	4A	11010008	
2681	Jacks Fk. (P)	7.5	Shannon/Texas	Escherichia coli	Other Recreational Pollution Sources	4A	11010008	
3233	Joyce Cr. (C)	4.5	Barry	Escherichia coli	Nonpoint Source	4A	11070207	Priority
7314	Lake Taneycomo (L2)	246	Taney	Dissolved oxygen saturation	Dam or Impoundment	4A	11010003	
7356	Lamar Lake (L1)	148	Barton	Nutrient/Eutrophication Biol. Indicators	Nonpoint Source	4A	11070207	Priority
3105	Lateral #2 Main Ditch (P)	11.5	Stoddard	Sedimentation/Siltation	Nonpoint Source	4A	8020204	

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
1438	L. Lindley Cr.(C)	3.7	Dallas	Aquatic Macroinvertebrate Bioassessments	Source Unknown	4B	10290107	
606	Locust Cr. (P)	19.4	Chariton/Putnam	Fishes Bioassessments	Channelization	4A	10280103	Priority
857	Long Br.(C)	6	Pettis/Johnson	Cause Unknown	Source Unknown	4A	10300103	
3652	L. Osage R. (C)	23.6	Vernon	Dissolved oxygen saturation	Source Unknown	4A	10290103	
1381	L. Sac R. (P)	37	Polk/Greene	Escherichia coli	Agriculture	4A	10290106	Priority
1381	L. Sac R. (P)	37	Polk/Greene	Escherichia coli	Nonpoint Source	4A	10290106	Priority
2814	Main Ditch (C)	1	Butler	Ammonia, Un-ionized	Municipal Point Source Discharges	4A	11010007	
2814	Main Ditch(C)	13	Butler	Oxygen, Dissolved	Source Unknown	4A	11010007	
1308	Marmaton R. (P)	35.7	Vernon	Oxygen, Dissolved	Nonpoint Source	4A	10290104	
2787	McKenzie Cr.(C)	4.7	Wayne	pH	Municipal Point Source Discharges	4A	11010007	
2787	McKenzie Cr.(C)	4.7	Wayne	pH	Source Unknown	4A	11010007	
2786	McKenzie Cr. (P)	6.3	Wayne	Oxygen, Dissolved	Municipal Point Source Discharges	4B	11010007	
1284	Middle Fk. Tebo Cr. (C)	3	Henry	Total Dissolved Solids	Coal Mining	4A	10290108	
1707	Mississippi R. (P)	0.4	Ste. Genevieve	Lead	Industrial Point Source Discharge	4A	7140101	
1707	Mississippi R. (P)	0.4	Ste. Genevieve	Zinc	Industrial Point Source Discharge	4A	7140101	
1234	Monegaw Cr. (C)	2.1	St. Clair	Sulfates	Coal Mining	4A	10290105	
1300	Mound Br. (C)	8.9	Bates	Dissolved oxygen saturation	Source Unknown	4A	10290102	
674	Mussel Fk. (C)	58	Macon/Sullivan	Escherichia coli	Nonpoint Source	4A	10280202	
56	N. Fabius R.(P)	92	Marion/Schuyler	Habitat Assessment, Streams	Channelization	4C	7110002	
942	N. Moreau Cr.(P)	10.9	Cole/Moniteau	Oxygen, Dissolved	Source Unknown	4A	10300102	Priority
1031	Osage R.(P)	9.7	Osage/Miller	Aquatic Macroinvertebrate Bioassessments	Dam or Impoundment	4C	10290111	

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
1387	Pea Ridge Cr. (P)	1.5	Greene	Aquatic Macroinvertebrate Bioassessme	Source Unknown	4C	10290106	Priority
216	Peruque Cr. (P)	0.3	St. Charles	Cause Unknown	Dam or Impoundment	4C	7110009	
1444	Piper Cr. (P)	5.3	Polk	Aquatic Macroinvertebrate Bioassessments	Source Unknown	4A	10290107	
3232	Pogue Cr.(C)	2.5	Barry	Escherichia coli	Nonpoint Source	4A	11070207	Priority
2128	Pond Cr.(C)	1	Washington	Sedimentation/Siltation	Mill Tailings	4A	7140104	
2128	Pond Cr.(C)	1	Washington	Zinc	Mill Tailings	4A	7140104	
2859	Saline Cr. (P)	1.7	Madison	Nickel	Mine Tailings	4A	8020202	
71	S. Fabius R. (P)	4.2	Marion/Knox	Fishes Bioassessments	Channelization	4C	7110003	
2170	Shaw Br.(C)	1.2	St. Francois	Lead	Mill Tailings	4A	7140104	
2120	Shibboleth Br. (C)	3	Washington	Lead	Mill Tailings	4A	7140104	
2120	Shibboleth Br. (C)	3	Washington	Zinc	Mill Tailings	4A	7140104	
2119	Shibboleth Br. (P)	1	Washington	Lead	Mill Tailings	4A	7140104	
2119	Shibboleth Br. (P)	1	Washington	Zinc	Mill Tailings	4A	7140104	
3231	Shoal Cr. (C)	5	Barry	Escherichia coli	Nonpoint Source	4A	11070207	Priority
3230	Shoal Cr. (P)	31.4	Newton/Barry	Escherichia coli	Nonpoint Source	4A	11070207	Priority
1870	Spring Cr.(P)	5.1	Dent	Oxygen, Dissolved	Municipal Point Source Discharges	4A	7140102	
1870	Spring Cr.(P)	5.1	Dent	Solids, Suspended/Bedload	Municipal Point Source Discharges	4A	7140102	
2835	St. Francis R. (P)	8.7	Wayne/St. Francois	Oxygen, Dissolved	Municipal Point Source Discharges	4A	8020202	
710	Stinson Cr. (C)	1.9	Callaway	Oxygen, Dissolved	Municipal Point Source Discharges	4A	10300102	Priority
710	Stinson Cr. (C)	1.9	Callaway	Oxygen, Dissolved	Natural Conditions, UAA Needed	4A	10300102	Priority
959	Straight Fk. (C)	6	Morgan	Chloride	Municipal Point Source Discharges	4A	10300102	Priority
686	Sugar Cr. (P)	6.8	Randolph	pH	Coal Mining, Subsurface	4A	10280203	
3822	Town Br. (P)	2.5	Polk	Cause Unknown	Source Unknown	4A	10290107	

Waterbody ID	Waterbody Name	Impaired Size	County	Cause	Source	Category	HUC 8	Priority Watershed
3822	Town Br.(P)	1.1	Polk	Total Suspended Solids - TSS	Municipal Point Source Discharges	4A	10290107	
3822	Town Br. (P)	1.1	Polk	Total Suspended Solids - TSS	Source Unknown	4A	10290107	
2850	Trace Cr. (C)	0.4	Madison	pH	Natural Sources	4A	8020202	
1288	Trib. M. Fk. Tebo Cr. (C)	3.1	Henry	pH	Coal Mining	4A	10290108	
1288	Trib. M. Fk. Tebo Cr. (C)	3.1	Henry	Total Dissolved Solids	Coal Mining	4A	10290108	
3940	Trib. to Big Cr. (US)	0.6	Iron	Cadmium	Ind./Comm. Site Stormwater Discharge,	4A	8020202	
					Permittee		8020202	
3940	Trib. to Big Cr. (US)	0.6	Iron	Zinc	Ind./Comm. Site Stormwater Discharge,	4A	8020202	
					Permittee		8020202	
1225	Trib. to Big Otter Cr. (C)	1	Henry	pH	Coal Mining	4A	10290108	
3663	Trib. to Indian Cr. (C)	0.3	Washington	Lead	Subsurface, Hardrock, Mining	4A	7140102	
3490	Trib. to L. Muddy Cr. (C)	1	Pettis	Temperature, water	Industrial Point Source Discharge	4A	10300103	
3216	Turkey Cr. (P)	7.7	Jasper	Zinc	Mill Tailings	4A	11070207	Priority
3282	Turkey Cr. (P)	1.2	St. Francois	Oxygen, Dissolved	Source Unknown	4A	7140104	
2863	Village Cr. (P)	1.9	Madison	Sedimentation/Siltation	Mill Tailings	4A	8020202	
1708	Watkins Cr.(C)	2.8	St. Louis City	Escherichia coli	Urban Runoff/Storm Sewers	4A	7140101	
613	W. Fk. Locust Cr.(C)	17	Sullivan	Oxygen, Dissolved	Source Unknown	4A	10280103	Priority
400	W. Fk. Sni-a-bar Cr. (P)	9	Jackson	Oxygen, Dissolved	Municipal Point Source Discharges	4A	10300101	Priority
400	W. Fk. Sni-a-bar Cr. (P)	9	Jackson	Oxygen, Dissolved	Source Unknown	4A	10300101	Priority
7009	Wyaconda Lake (L1)	9	Clark	Atrazine	Crop Production, Crop Land or	4A	7110001	
					Dry Land		7110001	

Appendix 6: Potentially impaired waters.

The following table list water for which there is some indication that an impairment to some designated use may exist, but the current data or information indicating the impairment do not meet the data requirements set out by Missouri's Section 303(d) Listing Methodology. As funding allows, the Department will conduct additional monitoring in these waters to determine if impairments exist.

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
334	Agee Cr.	4.80	Habitat Degradation	3B	10240012	
2093	Allen Br.	1.80	Fish Bioassessments/Unknown	3B	7140104	
1799	Apple Cr.	44.80	Aquatic Macroinvertebrate Bioassessments/Unkown	2B	7140105	
282	Arapahoe Cr.	8.00	Habitat Degradation	3B	10240010	
2880	Back Cr.	3.80	Low Dissolved Oxygen	3B	8020202	
1209	Barker Cr.	15.00	pH	3B	10290108	
7068	Bean Lake	420.00	nutrients all supporting, but just below the site specific critiera; limited fish tissue Hg/chlordane data indicates impairment. Additional fish tissue samples recommended - TR	3B	10240011	Priority
115	Bear Cr.	36.20	Low Dissolved Oxygen	3B	7110005	
272	Bear Cr.	9.80	Habitat Degradation	3B	10240011	Priority
416	Bear Cr.	4.50	Habitat Degradation	3B	10300101	Priority
1015	Bear Cr.	6.00	Fish Bioassessments/Unknown	3B	10300102	Priority
1220	Bear Cr.	7.40	Habitat Degradation	3B	10290108	
3265	Beaver Br.	2.00	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11070208	
3266	Beaver Br.	3.50	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11070208	
3267	Beaver Br.	1.50	Habitat Degradation	3B	11070208	
1509	Beaver Cr.	5.70	Fish Bioassessments/Unknown	3B	10290201	
273	Bee Cr.	29.40	Habitat Degradation	3B	10240011	Priority
3966	Bee Fk.	5.90	Heavy metals in Sediment	2B	11010007	
2179	Belew Cr.	7.00	Fish Bioassessments/Low Dissolved Oxygen	3B	7140104	
220	Belleau Cr.	5.10	Habitat Degradation	3B	7110009	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
1250	Big Cr.	70.50	Low Dissolved Oxygen	2B	10290108	
1608	Bigelow's Cr.	5.00	Low Dissolved Oxygen	3B	10300200	Priority
7185	Binder Lake	127.00	pH	2B	10300102	Priority
891	Blackwater R.	79.40	Habitat Degradation	2B	10300104	
421	Blue R.	12.00	Bacteria	2B	10300101	Priority
993	Blythes Cr.	6.90	Nutrients	3B	10300102	Priority
32	Bobs Cr.	1.70	nutrients all supporting, but just below the site specific criteria; limited fish tissue Hg/chlordane data indicates impairment. Additional fish tissue samples recommended - TR	2B	7110004	
1983	Brazil Cr.	13.90	Aquatic Macroinvertebrate Bioassessments/Unknown	3B	7140102	
276	Brush Cr.	7.40	Habitat Degradation	3B	10240011	Priority
408	Brush Cr.	5.90	Habitat Degradation	3B	10300101	Priority
2056	Brush Cr.	2.00	Fish Bioassessments/Unknown	3B	7140103	
336	Brushy Cr.	12.10	Habitat Degradation	3B	10240012	
377	Brushy Cr.	7.00	Habitat Degradation	3B	10300101	Priority
395	Brushy Cr.	2.20	Habitat Degradation	3B	10300101	Priority
7159	Bucklin Lake	17.00	nutrients all supporting, but just below the site specific criteria; limited fish tissue Hg/chlordane data indicates impairment. Additional fish tissue samples recommended - TR	2B	10280202	
2422	Bull Cr.	5.00	Habitat Degradation	2B	11010003	
3264	Bullskin Cr.	4.90	Fish Bioassessments/Unknown	2B	11070208	
363	Burr Oak Cr.	2.00	Habitat Degradation	3B	10300101	Priority
7120	Cameron Lake #1	25.00	Mercury in Fish Tissue	2B	10280101	
2431	Camp Cr.	1.00	Fish Bioassessments/Unknown	3B	11010003	
2833	Cane Cr.	9.80	Low Dissolved Oxygen	3B	11010007	
2560	Caney Cr.	7.00	Fish Bioassessments/Unknown	3B	11010006	
389	Carroll Cr.	9.40	Habitat Degradation	3B	10300101	Priority
322	Castile Cr.	40.20	Low Dissolved Oxygen	2B	10240012	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
3225	Cedar Cr.	2.20	Habitat Degradation	2B	11070207	Priority
7048	City Lake #2 - Perry	7.00	Atrazine	3B	7110007	
292	Clear Cr.	13.00	Habitat Degradation	3B	10240010	
388	Clear Cr.	5.00	Habitat Degradation	3B	10300101	Priority
390	Clear Cr.	13.50	Habitat Degradation	3B	10300101	Priority
2082	Clear Cr.	4.40	Fish Bioassessments/Unknown	3B	7140104	
225	Cole Cr.	5.70	Habitat Degradation	3B	7110009	
269	Contrary Cr.	10.00	Mercury in Fish Tissue	3B	10240011	Priority
1459	Contrary Cr.	4.50	Fish Bioassessments/Unknown	3B	10290203	
132	Coon Cr.	11.80	Low Dissolved Oxygen	2B	7110006	
410	Cottonwood Cr.	3.90	Habitat Degradation	3B	10300101	Priority
1947	Courtois Cr.	1.70	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7140102	
247	Cow Br.	4.40	Habitat Degradation	3B	10240005	
330	Crooked Cr.	2.80	Habitat Degradation	3B	10240012	
333	Crooked Cr.	4.00	Habitat Degradation	3B	10240012	
371	Crooked R.	58.10	Habitat Degradation	3B	10300101	Priority
376	Crooked R.	7.50	Habitat Degradation	3B	10300101	Priority
2616	Cypress Ditch #1	9.70	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11010008	
144	Davis Cr.	8.80	Low Dissolved Oxygen	3B	7110006	
255	Davis Cr.	3.50	Habitat Degradation	3B	10240005	
253	Davis Cr. Ditch	6.70	Habitat Degradation	3B	10240005	
320	Dicks Cr.	7.30	Habitat Degradation	3B	10240012	
268	Dillon Cr.	4.80	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10240011	Priority
2998	Ditch #10	3.50	Mercury in Fish Tissue	3B	8020203	
3813	Ditch #16	11.20	Low Dissolved Oxygen	3B	11010007	
2617	Ditch #2	3.20	Low Dissolved Oxygen	3B	11010008	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
2077	Ditch Cr.	1.80	Fish Bioassessments/Unknown	3B	7140104	
2776	Ditch to Black R.	10.70	Habitat Degradation	3B	11010007	
3418	Dry Cr.	9.30	Fish Bioassessments/Unknown	3B	7140104	
1862	Dry Fk.	23.30	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7140102	
1314	Dry Wood Cr.	29.90	Sulfates	2B	10290104	
1265	East Cr.	9.40	Low Dissolved Oxygen	2B	10290108	
2085	Ebo Cr.	1.60	Fish Bioassessments/Unknown	3B	7140104	
288	E. Br. Elkhorn Cr.	4.70	Habitat Degradation	3B	10240010	
257	E. Br. Squaw Cr.	4.20	Habitat Degradation	3B	10240005	
3107	E. Ditch #1	22.00	Low Dissolved Oxygen	3B	8020204	
414	Edmondson Cr.	1.90	Habitat Degradation	3B	10300101	Priority
373	E. Fk. Crooked R.	6.40	Habitat Degradation	3B	10300101	Priority
386	E. Fk. Fishing R.	12.90	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10300101	Priority
249	E. Fk. L. Tarkio Cr.	17.80	Habitat Degradation	3B	10240005	
932	E. Fk. Postoak Cr.	12.20	Habitat Degradation	3B	10300104	
398	E. Fk. Shoal Cr.	2.90	Bacteria	2B	10300101	Priority
402	E. Fk. Sni-a-bar Cr.	9.60	Habitat Degradation	3B	10300101	Priority
287	Elkhorn Cr.	11.80	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10240010	
331	Elm Grove Br.	4.20	Habitat Degradation	3B	10240012	
3370	Fassnight Cr.	2.80	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11010002	
1705	Fee Fee Cr. (old)	1.00	Habitat Degradation	3B	10300200	Priority
1607	Femme Osage Cr.	2.00	Fish Bioassessments/Unknown	3B	10300200	Priority
4120	Fenton Creek tributary	1.50	Habitat Degradation	2B	7140102	
7201	Finger Lakes	118.00	Mercury in Fish Tissue	2B	10300102	Priority
375	Fire Br.	5.40	Habitat Degradation	3B	10300101	Priority

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
318	First Cr.	4.70	Bacteria	3B	10240012	
394	Fishing R.	8.50	Bacteria	2B	10300101	Priority
1885	Fishwater Cr.	4.80	Low Dissolved Oxygen	3B	7140102	
3587	Fleck Cr.	4.30	Sulfates	3B	10290104	
289	Florida Cr.	8.40	Habitat Degradation	3B	10240010	
3942	Foster Br.	1.10	Low Dissolved Oxygen	3B	10300102	Priority
3373	Galloway Cr.	3.20	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11010002	
407	Garrison Fk.	6.80	Habitat Degradation	3B	10300101	Priority
1496	Gasconade R.	11.20	Fish Bioassessments/Unknown	3B	10290201	
233	Greys Lake	5.20	Habitat Degradation	3B	10240004	
321	Grove Cr.	3.30	Habitat Degradation	3B	10240012	
3204	Grove Cr.	2.90	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	2B	11070207	Priority
285	Hayzlett Br.	2.40	Habitat Degradation	3B	10240010	
2181	Heads Cr.	2.70	Fish Bioassessments/Unknown	3B	7140104	
596	Hickory Br.	6.80	Low Dissolved Oxygen	2B	10280103	Priority
266	Hickory Cr	1.00	Habitat Degradation	3B	10240005	
308	Hickory Cr.	1.20	Habitat Degradation	3B	10240010	
335	Hickory Cr.	1.50	Habitat Degradation	3B	10240012	
229	High Cr.	6.30	Habitat Degradation	3B	10240004	
228	High Cr. Ditch	3.70	Habitat Degradation	3B	10240004	
307	Highly Cr.	3.90	Habitat Degradation	3B	10240010	
350	Holland Br.	3.00	Habitat Degradation	3B	10240012	
351	Holtzclaw Cr.	2.00	Habitat Degradation	3B	10240012	
338	Honey Cr.	6.70	Habitat Degradation	3B	10240012	
919	Honey Cr.	7.00	Habitat Degradation	3B	10300104	
354	Horse Fk.	4.40	Atrazine	3B	10240012	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
306	Huff Cr.	2.00	Habitat Degradation	3B	10240010	
212	Indian Camp Cr.	3.50	Habitat Degradation	2B	7110008	
3256	Indian Cr.	30.80	Habitat Degradation	2B	11070208	
7288	Indian Lake	279.00	Mercury in Fish Tissue	2B	7140103	
234	Iowa Ditch	2.80	Habitat Degradation	3B	10240004	
286	Jenkins Cr.	7.20	Habitat Degradation	3B	10240010	
1719	Joachim Cr.	30.20	Lead	2B	7140101	
3968	Jones Br.	0.00	VOCs in Sediment	3B	11010002	
974	Jones Cr.	4.00	Habitat Degradation	3B	10300102	Priority
275	Jordan Br.	7.20	Habitat Degradation	3B	10240011	Priority
329	Jordan Cr.	1.40	Habitat Degradation	3B	10240012	
384	Keeney Cr.	4.90	Habitat Degradation	3B	10300101	Priority
262	Kimsey Cr.	0.80	Habitat Degradation	3B	10240005	
263	Kimsey Cr.	2.50	Habitat Degradation	3B	10240005	
264	Kimsey Cr.	6.70	Habitat Degradation	3B	10240005	
1334	Kitten Cr.	7.20	Low Dissolved Oxygen	3B	10290105	
7064	Lake Contrary	291.00	Nutrients	3B	10240011	Priority
359	Lake Cr.	5.70	Habitat Degradation	3B	10300101	Priority
1656	L. Berger Cr.	1.20	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	3B	10300200	Priority
424	L. Blue R.	4.30	Habitat Degradation	3B	10300101	Priority
3591	L. Fox Cr.	0.70	Fish Bioassessments/Unknown	3B	7140102	
7111	Limpp Community State Lake	27.00	Mercury in Fish Tissue	2B	10240012	
280	Lincoln Cr.	7.40	Habitat Degradation	3B	10240010	
243	Long Br.	3.00	Habitat Degradation	3B	10240005	
3531	Long Grove Br.	3.20	Low Dissolved Oxygen	3B	10300103	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
1617	Lost Cr.	6.40	Fish Bioassessments/Unknown	3B	10300200	Priority
403	L. Sni-a-bar Cr.	6.70	Habitat Degradation	3B	10300101	Priority
404	L. Sni-a-bar Cr.	7.50	Habitat Degradation	3B	10300101	Priority
409	L. Tabo Cr.	9.20	Habitat Degradation	3B	10300101	Priority
250	L. Tarkio Cr.	15.40	Habitat Degradation	3B	10240005	
251	L. Tarkio Ditch	6.60	Habitat Degradation	3B	10240005	
328	L. Third Fk. Platte R.	26.00	Habitat Degradation	3B	10240012	
425	Lumpkin Cr.	0.50	Habitat Degradation	3B	10300101	Priority
267	Mace Cr.	5.80	Habitat Degradation	3B	10240011	Priority
3277	Mason Springs Valley	1.00	Bacteria	3B	11070206	
1338	McCarty Cr.	13.20	Habitat Degradation	3B	10290105	
7319	McCormack Lake	9.00	Mercury in Fish Tissue	3B	11010011	
213	McCoy Cr.	1.90	Nutrients	2B	7110008	
231	McElroy Cr.	3.00	Habitat Degradation	3B	10240004	
324	McGuire Br.	5.40	Habitat Degradation	3B	10240012	
1321	McKill Cr.	2.70	Sulfates and pH	3B	10290104	
1324	McKill Cr.	2.20	Sulfates and pH	3B	10290104	
31	McLean Cr.	6.60	Nutrients	3B	7110004	
2185	Meramec R.	15.70	Lead	2B	7140102	
691	M. Fk. Little Chariton R.	31.50	Sulfates	2B	10280203	
3415	Middle Big Cr.	9.40	Low Dissolved Oxygen	3B	10290108	
258	Middle Br. Squaw Cr.	3.00	Habitat Degradation	3B	10240005	
2744	Middle Fk. Black R.	21.00	Fish Bioassessments/Unknown	2B	11010007	
245	Middle Tarkio Cr.	10.00	Habitat Degradation	3B	10240005	
159	Mill Cr.	5.00	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7110008	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
265	Mill Cr.	10.00	Habitat Degradation	3B	10240005	
301	Mill Cr.	10.80	Habitat Degradation	3B	10240010	
740	Millers Cr.	1.90	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10300102	Priority
1707	Mississippi R.	28.30	Bacteria	2B	7140101	
1544	Mistaken Cr.	1.50	Habitat Degradation	3B	10290203	
755	Moniteau Cr.	14.40	Sulfates and pH	3B	10300102	Priority
1315	Moore's Br.	3.00	Habitat Degradation	3B	10290104	
302	Moss Br.	2.40	Habitat Degradation	3B	10240010	
369	Moss Cr.	13.70	Habitat Degradation	3B	10300101	Priority
426	Mouse Cr.	1.50	Low Dissolved Oxygen	2B	10300101	Priority
343	Mozingo Cr.	5.10	Habitat Degradation	3B	10240013	
291	Muddy Cr.	5.20	Habitat Degradation	3B	10240010	
391	Muddy Fk.	8.40	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	10300101	Priority
277	Naylor Cr.	1.00	Habitat Degradation	3B	10240011	Priority
2752	Neals Cr.	3.20	Nickel in Sediment	2B	11010007	
392	New Hope Cr.	5.50	Habitat Degradation	3B	10300101	Priority
309	Nichols Cr.	4.60	Habitat Degradation	3B	10240010	
344	Norvey Cr.	9.30	Habitat Degradation	3B	10240013	
49	N. Wyaconda R.	9.20	Habitat Degradation	3B	7110001	
284	Old Chan. Nodaway R.	10.00	Habitat Degradation	3B	10240010	
294	Old Chan. Nodaway R.	1.20	Habitat Degradation	3B	10240010	
295	Old Chan. Nodaway R.	2.00	Habitat Degradation	3B	10240010	
297	Old Chan. Nodaway R.	1.50	Habitat Degradation	3B	10240010	
298	Old Chan. Nodaway R.	1.00	Habitat Degradation	3B	10240010	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
299	Old Chan. Nodaway R.	2.50	Habitat Degradation	3B	10240010	
300	Old Chan. Nodaway R.	3.70	Habitat Degradation	3B	10240010	
304	Old Chan. Nodaway R.	2.50	Habitat Degradation	3B	10240010	
305	Old Chan. Nodaway R.	2.80	Habitat Degradation	3B	10240010	
311	Old Chan. Nodaway R.	1.00	Habitat Degradation	3B	10240010	
325	Old Chan. Platte R.	3.40	Habitat Degradation	3B	10240012	
326	Old Chan. Platte R.	2.20	Habitat Degradation	3B	10240012	
332	Old Chan. Platte R.	4.00	Habitat Degradation	3B	10240012	
341	Old Chan. Platte R.	5.00	Habitat Degradation	3B	10240012	
348	Old Chan. Platte R.	1.00	Habitat Degradation	3B	10240012	
368	Old Chan. Wakenda Cr.	3.00	Habitat Degradation	3B	10300101	Priority
260	Old Ch. L. Tarkio Cr.	5.30	Habitat Degradation	3B	10240005	
261	Old Ch. L. Tarkio Cr.	8.30	Habitat Degradation	3B	10240005	
238	Old Ch. Nishnabotna R.	13.70	Habitat Degradation	3B	10240005	
240	Old Ch. Nishnabotna R.	3.00	Habitat Degradation	3B	10240005	
26	Old Kings Lake Cr.	6.20	Nutrients	3B	7110004	
1472	Osage Fk.	69.00	Bacteria	2B	10290201	
2962	Otter Cr.	6.00	Low Dissolved Oxygen	3B	8020202	
357	Palmer Cr.	12.20	Habitat Degradation	3B	10300101	Priority
358	Palmer Cr.	2.80	Habitat Degradation	3B	10300101	Priority
7441	Palmer Lake	102.00	Mercury in Fish Tissue	2B	7140102	
521	Panther Cr.	5.00	Habitat Degradation	3B	10280101	
2425	Peckout Hollow	1.80	Habitat Degradation	3B	11010003	
283	Pedlar Cr.	5.40	Habitat Degradation	3B	10240010	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
1616	Peers Slough	3.00	Fish Bioassessments/Unknown	3B	10300200	Priority
349	Pigeon Cr.	7.20	Habitat Degradation	3B	10240012	
1728	Plattin Cr.	19.90	Ammonia	2B	7140101	
2058	Pleasant Valley Cr.	1.70	Habitat Degradation	3B	7140103	
2192	Pomme Cr.	1.80	Habitat Degradation	3B	7140102	
2127	Pond Cr.	1.30	Zinc in Sediment and Sediment Deposition	2B	7140104	
313	Prairie Cr.	3.70	Habitat Degradation	3B	10240012	
2037	Red Oak Cr.	5.20	Low Dissolved Oxygen	2B	7140103	
136	Reese Fk.	7.00	Low Dissolved Oxygen	3B	7110006	
347	Riggin Br.	1.90	Habitat Degradation	3B	10240013	
3827	River des Peres	3.70	Chloride and Bacteria	3B	7140101	
355	Roberts Br.	2.00	Atrazine	3B	10240012	
236	Rock Cr.	2.20	Habitat Degradation	3B	10240005	
237	Rock Cr.	19.00	Low Dissolved Oxygen	3B	10240005	
378	Rocky Fk.	4.00	Habitat Degradation	3B	10300101	Priority
382	Rollins Cr.	7.00	Habitat Degradation	3B	10300101	Priority
278	Rush Cr.	4.50	Bacteria	3B	10240011	Priority
2189	Saline Cr.	1.80	Low Dissolved Oxygen	3B	7140102	
2190	Saline Cr.	2.30	Low Dissolved Oxygen	3B	7140102	
413	Salt Br.	5.70	Habitat Degradation	3B	10300101	Priority
290	Sand Cr.	4.90	Habitat Degradation	3B	10240010	
952	Scott Br.	0.50	Ammonia and Low Dissolved Oxygen	3B	10300102	Priority
317	Second Cr.	11.50	Habitat Degradation	3B	10240012	
1319	Second Nicolson Cr.	4.50	Sulfates	2B	10290104	
7253	See Tal Lake	11.00	Mercury in Fish Tissue	3B	10300200	Priority
921	S. Fk. Blackwater R.	5.70	Habitat Degradation	3B	10300104	

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
293	S. Fk. Clear Cr.	6.00	Habitat Degradation	3B	10240010	
385	Shackelford Br.	5.90	Habitat Degradation	3B	10300101	Priority
450	Shain Cr.	13.00	Nutrients	3B	10280101	
87	Sharpsburg Br.	1.50	Habitat Degradation	3B	7110004	
2865	Shays Cr.	1.70	Arsenic and Lead in Sediment	3B	8020202	
396	Shoal Cr.	10.30	Habitat Degradation	3B	10300101	Priority
397	Shoal Cr.	10.60	Low Dissolved Oxygen	2B	10300101	Priority
1934	Shoal Cr.	7.70	Fish Bioassessments/Unknown	3B	7140102	
3229	Shoal Cr.	0.50	Bacteria	3B	11070207	Priority
739	Smith Cr.	1.50	pH and Conductivity	3B	10300102	Priority
353	Smith Fk.	3.00	Habitat Degradation	3B	10240012	
7077	Smithville Lake	7190.00	Low Dissolved Oxygen	3B	10240012	
401	Sni-a-bar Cr.	4.30	Habitat Degradation	3B	10300101	Priority
3369	South Cr.	3.80	Bacteria	2B	11010002	
3	South R.	16.30	Nutrients	2B	7110004	
7187	Spring Fork Lake	178.00	Nutrients	2B	10300103	
3159	Spring R.	0.50	Metals in Sediment	3B	11070207	Priority
3167	Spring R.	1.00	Bacteria	3B	11070207	Priority
252	Squaw Cr.	21.00	Habitat Degradation	3B	10240005	
1486	Steins Cr.	16.60	Fish Bioassessments/Unknown	3B	10290201	
2355	Stewart Cr.	3.00	Fish Bioassessments/Unknown	3B	11010002	
2751	Strother Cr.	6.00	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	2B	11010007	
3965	Strother Cr.	0.90	Metals	2B	11010007	
1030	Sugar Br.	3.00	Nutrients	3B	10300102	Priority
270	Sugar Cr.	3.00	Habitat Degradation	3B	10240011	Priority
271	Sugar Cr.	6.50	Habitat Degradation	3B	10240011	Priority

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
2866	Sweetwater Br.	1.00	Heavy metals in Sediment	3B	8020202	
2867	Sweetwater Br.	1.70	Lead in Sediment	3B	8020202	
405	Tabo Cr.	11.40	Habitat Degradation	3B	10300101	Priority
406	Tabo Cr.	8.40	Habitat Degradation	3B	10300101	Priority
2509	Tabor Cr.	5.60	Aquatic Macroinvertebrate and Fish Bioassessments/Unknown	3B	11010006	
7045	Teal Lake	84.00	Mercury in Fish Tissue	3B	7110006	
3130	Tenmile Pond	5.10	Nutrients and DDT	3B	8020201	
3763	Tiff Cr.	2.10	Fish Bioassessments/Unknown	3B	7140104	
2759	Toms Cr.	2.20	Metals	3B	11010007	
274	Trib. to Bee Cr.	1.80	Habitat Degradation	3B	10240011	Priority
3967	Trib. to Bee Cr.	0.50	Metals	3B	11010007	
2923	Trib. to Big Cr.	1.00	Metals in Sediment	3B	8020202	
323	Trib. to Castile Cr.	1.20	Habitat Degradation	3B	10240012	
393	Trib. to Clear Cr.	2.20	Habitat Degradation	3B	10300101	Priority
133	Trib. to Coon Cr.	2.00	Low Dissolved Oxygen	2B	7110006	
365	Trib to Crabapple Cr.	1.30	Habitat Degradation	3B	10300101	Priority
254	Trib. to Davis Cr.	3.00	Habitat Degradation	3B	10240005	
415	Trib. to Edmondson Cr.	3.10	Habitat Degradation	3B	10300101	Priority
374	Trib. to E. Fk. Crooked R.	4.80	Habitat Degradation	3B	10300101	Priority
429	Trib. to E. Fk. L. Blue R.	1.90	Habitat Degradation	3B	10300101	Priority
232	Trib. to High Cr.	2.00	Habitat Degradation	3B	10240004	
3962	Trib. to L. Blue R.	5.90	Habitat Degradation	2B	10300101	Priority
303	Trib. to Mill Cr.	1.80	Habitat Degradation	3B	10240010	
2115	Trib. to Mineral Fk.	2.00	Metals in Sediment	2B	7140104	
411	Trib. to Missouri R.	5.30	Habitat Degradation	3B	10300101	Priority

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
370	Trib. to Moss Cr.	0.50	Habitat Degradation	3B	10300101	Priority
310	Trib. to Nichols Cr.	1.30	Habitat Degradation	3B	10240010	
3261	Trib. to N. Indian Cr.	1.30	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	11070208	
281	Trib. to Nodaway R.	1.00	Habitat Degradation	3B	10240010	
314	Trib. to Prairie Cr.	1.00	Habitat Degradation	3B	10240012	
2868	Trib. to Sweetwater Br.	1.00	Lead in Sediment	3B	8020202	
239	Tr. to O. Ch. Nishnabotna R.	0.90	Habitat Degradation	3B	10240005	
241	Tr. to O. Ch. Nishnabotna R.	2.00	Habitat Degradation	3B	10240005	
361	Turkey Cr.	4.70	Habitat Degradation	3B	10300101	Priority
362	Turkey Cr.	3.50	Habitat Degradation	3B	10300101	Priority
412	Van Meter Ditch	4.50	Habitat Degradation	3B	10300101	Priority
360	Wakenda Cr.	29.20	Habitat Degradation	3B	10300101	Priority
364	Wakenda Cr.	10.60	Habitat Degradation	3B	10300101	Priority
2136	Wallen Cr.	1.40	Aquatic Macroinvertebrate Bioassessments/Unkown	3B	7140104	
1339	Walnut Cr.	2.30	Low Dissolved Oxygen	3B	10290105	
7137	Walt Disney Lake	19.00	Chloride and Sulfate	2B	10280103	Priority
2374	Ward Br.	3.30	Bacteria, Aquatic Macroinvertebrate Bioassessments/Unknown, pH	3B	11010002	
7087	Watkins Mill Lake	87.00	Bacteria	3B	10300101	Priority
7072	Waukomis Lake	76.00	Mercury and Chlordane in Fish Tissue	2B	10240011	Priority
379	W. Fk. Crooked R.	6.60	Habitat Degradation	3B	10300101	Priority
380	W. Fk. Crooked R.	9.80	Habitat Degradation	3B	10300101	Priority
3310	W. Fk. East Cr.	4.80	Habitat Degradation	2B	10290108	
929	W. Fk. Post Oak Cr.	12.80	Habitat Degradation	3B	10300104	
366	W. Fk. Wakenda Cr.	3.30	Habitat Degradation	3B	10300101	Priority
367	W. Fk. Wakenda Cr.	7.80	Habitat Degradation	3B	10300101	Priority

Waterbody Id	Waterbody Name	Size	Potential Pollutant or Condition	Category Code	HUC 8	Priority Watershed
1639	Whetstone Cr.	10.80	Fish Bioassessments/Unknown	2B	10300200	Priority
230	W. High Cr.	2.80	Habitat Degradation	3B	10240004	
346	White Cloud Cr.	12.80	Habitat Degradation	3B	10240013	
259	Wildcat Cr.	4.00	Habitat Degradation	3B	10240005	
387	Williams Cr.	9.10	Habitat Degradation	3B	10300101	Priority
381	Willow Cr.	6.50	Habitat Degradation	3B	10300101	Priority
7110	Worth County Community Lake	17.00	Chlorophyll	2B	10280101	
244	W. Tarkio Cr.	1.20	Habitat Degradation	3B	10240005	
246	W. Tarkio Cr.	9.60	Habitat Degradation	3B	10240005	
47	Wyaconda R.	42.20	Bacteria	2B	7110001	

Appendix 7: Status of Source Water Protection Plans

The below table provides the status of communities with a source water protection plan.

Permit ID	Community Name	County	Status	End Date
MO5010040	Ava	Douglas	A	6/30/2024
MO5024023	Barton Dade Cedar Jasper Co. Cons. PWSD #1	Barton	A	12/28/2019
MO3010054	Belle	Osage	A	6/30/2024
MO3024058	Boone Co. PWSD #9	Boone	A	6/30/2023
MO1010098	Braymer	Caldwell	A	10/14/2019
MO4010120	Cabool	Texas	A	6/30/2024
MO3021377	Camden Co. PWSD #4 - Horseshoe Bend	Camden	A	6/30/2023
MO1010131	Cameron	Clinton	A	6/30/2023
MO2024105	Carroll Co. PWSD #1	Carroll	A	6/30/2023
MO2010140	Carrollton	Carroll	A	6/30/2023
MO4010143	Caruthersville	Pemiscot	A	6/30/2023
MO5010144	Cassville	Barry	A	6/30/2023
MO3010149	Centertown	Cole	A	6/30/2023
MO2020421	Clarence Cannon Wholesale Water Commission	Monroe	A	10/14/2019
MO2010169	Clarksville	Pike	A	6/30/2023
MO3024162	Cole Co. PWSD #3	Cole	A	6/30/2024
MO3010181	Columbia	Cole	A	6/30/2023
MO1036130	Daviess Co. PWSD #3	Daviess	A	6/30/2024
MO6024213	Franklin Co. PWSD #3	Franklin	A	6/30/2023
MO4010290	Fredericktown	Madison	A	6/30/2023
MO1010342	Hamilton	Daviess	A	6/30/2024
MO5010351	Hartville	Wright	A	6/30/2023
MO1010363	Higginsville	Lafayette	A	6/30/2024

Permit ID	Community Name	County	Status	End Date
MO1010399	Independence	Jackson	A	6/30/2024
MO4010402	Ironton	Iron	A	6/30/2022
MO6024300	Jefferson Co. PWSD #8	Jefferson	A	6/30/2023
MO1024311	Johnson Co. PWSD #3	Johnson	A	6/30/2023
MO4010417	Kennett	Dunklin	A	6/30/2023
MO1010426	Kingston	Caldwell	A	7/13/2019
MO2010429	Kirksville	Adair	A	10/14/2019
MO5010446	Lamar	Barton	A	6/30/2023
MO1010466	Liberty	Clay	A	6/30/2024
MO2010487	Macon	Macon	A	6/30/2023
MO4010496	Marble Hill - North	Bollinger	A	6/30/2024
MO4010483	Marble Hill - South	Bollinger	A	6/30/2024
MO2010497	Marceline	Chariton	A	6/30/2024
MO2010512	Meadville	Linn	A	6/30/2024
MO6031523	Mirasol Subdivision	Jefferson	A	6/30/2023
MO2010109	Mo American - Brunswick	Chariton	A	6/30/2023
MO5010413	Mo American - Joplin	Jasper	A	6/30/2024
MO2010519	Mo American - Mexico	Audrain	A	6/30/2024
MO1010714	Mo American - St. Joseph	Buchanan	A	6/30/2024
MO1010833	Mo American - Warrensburg	Johnson	A	6/30/2023
MO2010533	Moberly	Randolph	A	6/30/2023
MO1010548	Mound City	Holt	A	6/30/2024
MO5010550	Mountain Grove	Wright	A	6/30/2023
MO6010565	New Florence	Montgomery	A	12/28/2019
MO2021537	North Central MO Regional Water Commission	Grundy	A	6/30/2023
MO1010580	North Kansas City	Clay	A	6/30/2023

Permit ID	Community Name	County	Status	End Date
MO5010585	Norwood	Wright	A	6/30/2024
MO6010588	OFallon	St. Charles	A	6/30/2023
MO5010606	Oronogo	Jasper	A	6/30/2024
MO3011367	Osage Beach East	Camden	A	12/28/2019
MO3011346	Osage Beach West	Camden	A	12/28/2019
MO2010623	Palmyra	Marion	A	10/14/2019
MO3010642	Pilot Grove	Cooper	A	6/30/2023
MO1024478	Platte Co. PWSD #4	Clay	A	6/30/2023
MO2010664	Princeton	Mercer	A	6/30/2023
MO3024491	Pulaski Co. PWSD #2	Pulaski	A	6/30/2023
MO6036271	Raintree Plantation	Jefferson	A	6/30/2023
MO1010682	Rich Hill	Bates	A	6/30/2023
MO2010736	Shelbina	Shelby	A	6/30/2024
MO2010745	Slater	Saline	A	6/30/2024
MO5021116	Southwest Rural Water District #1	Barry	A	6/30/2024
MO5010754	Springfield	Greene	A	6/30/2024
MO4024539	St. Francois Co. PWSD #2	St. Francois	A	6/30/2024
MO4024544	Ste. Genevieve Co. PWSD #1 - North	Ste. Genevieve	A	6/30/2023
MO4024543	Ste. Genevieve Co. PWSD #1 - South	Ste. Genevieve	A	6/30/2023
MO6010799	Truesdale	Warren	A	6/30/2024
MO4021311	Wayne & Butler Co. PWSD #4	Wayne	A	6/30/2024
MO1010851	Weston	Platte	A	6/30/2024
MO5010860	Willard	Greene	A	6/30/2023
MO1010006	Albany	Gentry	E	2014
MO1010068	Bethany	Harrison	E	2009
MO6010077	Bland	Gasconade	E	3/31/2015

Permit ID	Community Name	County	Status	End Date
MO3024055	Boone Co. Cons. PWSD #1	Boone	E	9/30/2013
MO2010091	Bosworth	Carroll	E	5/31/2012
MO2010093	Bowling Green	Pike	E	2000
MO5010158	Branson West	Stone	E	7/27/2015
MO3010115	Bunceton	Cooper	E	2013
MO1010118	Butler	Bates	E	4/6/2019
MO3010124	California	Moniteau	E	2009
MO2010134	Canton	Lewis	E	4/15/2016
MO3010180	Cole Camp	Benton	E	3/2/2019
MO1010184	Concordia	Lafayette	E	2001
MO1010191	Craig	Holt	E	2005
MO3010196	Crocker	Pulaski	E	3/2/2019
MO6010200	Cuba	Crawford	E	2/9/2011
MO3010219	Dixon	Pulaski	E	2007
MO1010299	Gallatin	Daviess	E	4/6/2019
MO1010346	Hardin	Ray	E	2003
MO1010349	Harrisonville	Cass	E	2009
MO4024264	Howell Co. PWSD #1	Howell	E	10/23/2018
MO4021164	Howell Co. PWSD #3	Howell	E	7/13/2015
MO6010401	Irondale	Washington	E	7/27/2015
MO3024413	Laurie	Morgan	E	4/6/2006
MO1010460	Leeton	Johnson	E	4/6/2019
MO1010510	Maysville	DeKalb	E	3/2/2019
MO2010538	Monroe City	Monroe	E	2002
MO6010539	Montgomery City	Montgomery	E	2006
MO2010578	Norborne	Carroll	E	2008

Permit ID	Community Name	County	Status	End Date
MO1010605	Oregon	Holt	E	2008
MO6010618	Owensville	Gasconade	E	1/26/2015
MO3010728	Sedalia	Pettis	E	8/17/2015
MO4240120	S-F Scout Ranch	Madison	E	2012
MO1010748	Smithville	Clay	E	2009
MO6010707	St. Charles	St. Charles	E	12/12/2014
MO3010767	Stover	Morgan	E	10/24/2015
MO1071079	Tri-County Water Authority	Jackson	E	2008
MO6010798	Troy	Lincoln	E	2008
MO2010804	Unionville	Putnam	E	2007
MO2010812	Vandalia	Ralls	E	2011
MO5010829	Walnut Grove	Greene	E	2004

a=active; e=ended

Appendix 8: 9-Elements of a Watershed-Based Planning Checklist and Alternatives to 9-Element Plans.

The below table is a copy of EPA's 9-element watershed based plan reviewer checklist. The checklist is used by both EPA and state when reviewing watershed based plans to determine if the plan addresses the critical elements. Following the 9-element checklist is a narrative description of alternative plans.

9-Element Watershed-Based Plan Checklist			
Watershed Management Plan Title:		Waterbody ID, Hydrologic Unit Code:	
() Draft Review, version number: or () Final Version		Reviewer:	Review Date:
Counties:		Project Name/Number:	
A TMDL for This Watershed is: ("X" as applicable): a) () Approved () In Draft b) No TMDL Has Been Developed to Date: ()		Comments: a) () Accept b) () Accept with Comments c) () Needs Revision	
Element A: Causes and Sources of Pollution			
Criteria	Brief Description	Reference Document	Page(s)
1. Water body use designations, water quality criteria or standards, and impaired uses for waters in the project area, including HUC information are described.			
2. Specific causes and sources of 303(d) impairments, are listed by waterbody segment (ID), length, and area impaired.			
3. If a TMDL exists, specific causes and sources of the impairments are described using the waterbody segments (ID), length, and area impaired.			

4. Specific NPS sources of impairments are mapped or identified by area, category/subcategory, facility type, etc.			
5. Any point sources are identified and their potential impacts are listed.			
6. Causes of impairment are broken down by source and quantified by load, percentage, priority, or other method to identify the extent of the source treated (such as x number of animal feeding operations within segment y).			
7. Maps are used to identify specific, critical/targeted areas within the watershed, and to estimate the areas and/or length of their extent.			
Element B: Expected Load Reductions			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. The watershed-based plan includes load reductions needed to meet water quality criteria or standards for the 303(d) list or TMDL in impaired streams and achieve the environmental goal. This is a requirement of the WBP.			
2. The source of the load reduction information (TMDL, modeling, monitoring) is identified to <i>estimate</i> pollutant load reductions (assumptions and limitations should be stated).			
3. The plan provides <i>estimates</i> of potential load reductions for each pollutants cause/source, or groups of similar sources that need to be managed.			

Element C: Proposed Management Measures			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. BMPs needed to address each cause and source of pollution are listed, described, prioritized, and mapped to meet load reductions that will achieve water quality criteria or standards for the impairment.			
2. Specific BMPs are identified and rationalized as the appropriate and acceptable BMPs for the impairment in the critical/targeted areas.			
3. Expected load reductions are identified within the critical/targeted areas.			
Element D: Technical, Financial, and Regulatory Assistance Needs			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. The entity (SWCD, county, city, watershed group, etc.) responsible for managing the watershed-based plan funds is listed.			
2. Cost estimates reflect all planning and implementation costs.			
3. Cost estimates are provided for each type of BMP.			
4. Information is provided on how the cost estimate was determined.			
5. All attainable funding and technical sources are identified for federal, state, local, and private contributions, including all sources of match.			

6. Funding is strategically allotted - BMP funding available from other sources (NRCS and SWCP) is not duplicated by §319 funding.			
Element E: Information and Education			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. An overall strategy for the information, education, and participation component is described and will engage stakeholders (i.e., federal, state, local, private).			
2. Education/outreach materials will be utilized (e.g., public meetings, watershed events, multimedia campaigns, news articles, signage in high visibility areas)			
3. The watershed-based plan includes an evaluation process to determine its effectiveness (i.e., surveys).			
Element F: Implementation Schedule			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. Implementation schedule (e.g., by season or quarter) includes expected accomplishments and the interim milestones listed in Element G.			
Element G: Measurable Milestones and Project Outcomes			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. A schedule is provided of reasonable and attainable interim milestones, benchmarks, phases, or steps for implementing each group of management measures.			

2. A logical sequence of timelines for achieving the milestones, benchmarks, phases, or steps is listed.			
Element H: Evaluation Criteria			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. The watershed-based plan defines quantitative measures of water quality (e.g., pollution reduction such as increased fish diversity, increased DO, reduced <i>E. coli</i> levels, numbers of beach closings).			
2. The watershed-based plan uses the water quality measures utilized in <i>Element H.1.</i> to estimate the improved conditions at future points in time. (i.e., the plan could use five-year increments: “in 5 years, phosphorus levels will be at ... and <i>E. coli</i> levels will be at ...”)			
3. The plan shows an overall trend with the goal of achieving water quality criteria or standards in the affected waterbody.			
4. The watershed-based plan identifies when the overall strategy needs to be re-evaluated and how that will be done if anticipated goals are not met.			
Element I: Monitoring			
<i>Criteria</i>	<i>Brief Description</i>	<i>Reference Document</i>	<i>Page(s)</i>
1. The monitoring plan effectively measures progress towards meeting the water quality criteria or standards.			

a. The watershed-based plan includes indicators/parameters monitored.			
b. The entity performing sampling is identified.			
c. Pre/post BMP installation sampling or upstream/downstream sampling is planned to determine BMP effectiveness.			
d. The watershed-based plan includes an appropriate number of monitoring stations.			
e. The watershed-based plan lists adequate sampling frequency and time of year.			
2. Monitoring will demonstrate the effectiveness of implementing management measures over time.			
Comments			
<i>List any places where the watershed-based plan satisfied or failed to satisfy the review criteria. Reference any elements where information is needed to satisfy the review criteria. Add additional comments to consider for future revisions.</i>			

Alternatives to 9-Element Watershed-based Plans

EPA recognizes that, in lieu of a WBP, alternative plans may provide an effective roadmap to achieve the water quality goals of §319-funded restoration or protection efforts. In such cases, states must provide the EPA region administrator with justification for why a complete WBP is not necessary and why an alternative plan is sufficient to guide watershed project implementation. This justification may be described through, or included in, the state's §319 work plan.

Except when addressing a NPS pollution emergency or urgent NPS public health risk, EPA requires that all projects implementing a WBP or acceptable alternative plan directly address priorities outlined in the state NPS management program. Additionally, the state must ensure that alternative plans reflect a geographically-appropriate scale to achieve water quality goals. Prior to implementation, all plans should include sufficient analysis to ensure the water quality problem or threat can be fully addressed through the recommended management strategies outlined in the plan.

EPA regions will review and approve all alternative plans proposed for implementation in the state's §319 grant work plan to ensure the following planning elements are adequately addressed:

- Identification of the causes or sources of NPS impairment, water quality problem, or threat to unimpaired/high quality waters;
- Watershed project goal(s) and explanation of how the proposed project(s) will achieve or make advancements towards achieving water quality goals;
- Schedule and milestones to guide project implementation;
- Proposed management measures (including a description of operation and maintenance requirements) and explanation of how these measures will effectively address the NPS impairment identified above; and
- Water quality results monitoring component, including description of process and measures (e.g., water quality parameters, stream flow metrics, biological indicators) to gauge project success.

EPA regions may approve the use of watershed project funding to implement alternative plans containing the above elements in the following circumstances:

a. When the impairment is not specific to a pollutant.

The current WBP approach places emphasis on identifying major NPS pollutant sources in critical areas as well as planning for and achieving NPS pollutant load reductions. In scenarios where the impairment is not caused by a pollutant, but rather by a non-pollutant-based water quality problem (e.g., obstructions for migratory fish or addressing flow regime alterations), an alternative plan may be sufficient to guide §319 funded watershed projects. In such cases, the state should provide assurance that appropriate watershed analyses were conducted to ascertain that the water quality problem will be fully addressed by dealing with the non-pollutant source of impairment.

b. When responding to a NPS pollution emergency or urgent NPS public health risk.

In scenarios when the proposed §319 project(s) responds to an urgent, unplanned NPS pollution emergency or urgent NPS public health risk in an area for which a WBP does not exist (e.g., efforts to control erosion and re-establish vegetation in the immediate aftermath of a forest fire, to reduce pollution affecting drinking water safety), an alternative plan may be developed to ensure the timely, targeted use of watershed project funds.

c. When protecting assessed unimpaired/high quality waters.

Where a watershed includes both impaired and unimpaired/high quality waters, a WBP should be developed to address all actions needed to maintain and restore water quality. In scenarios where a state has assessed waters that are largely or fully attaining water quality standards and are located in watersheds where only protection actions are needed (i.e., measures to prevent future degradation), an alternative to a WBP may be warranted.

d. When addressing an isolated, small-scale water quality problem resulting from one or a few sources of pollution.

An alternative plan may be acceptable when the NPS problem and solution are extremely limited in scope and scale, such that the water quality problem is caused by one or a very few pollution sources (e.g., a failing septic system). In such cases, the state must demonstrate (through up- and downstream monitoring, watershed characterization studies, etc.) that this impairment is isolated from other potential contributing causes/sources of pollution in the watershed. Additionally, the state must provide assurance that the proposed watershed project will fully address the water quality problem within one grant period. In meeting these conditions, the state will ensure that multiple smaller problems are not dealt with in a piecemeal fashion when they are actually part of a larger water quality problem involving multiple pollution sources in the watershed.

Appendix 9: Core water quality parameters

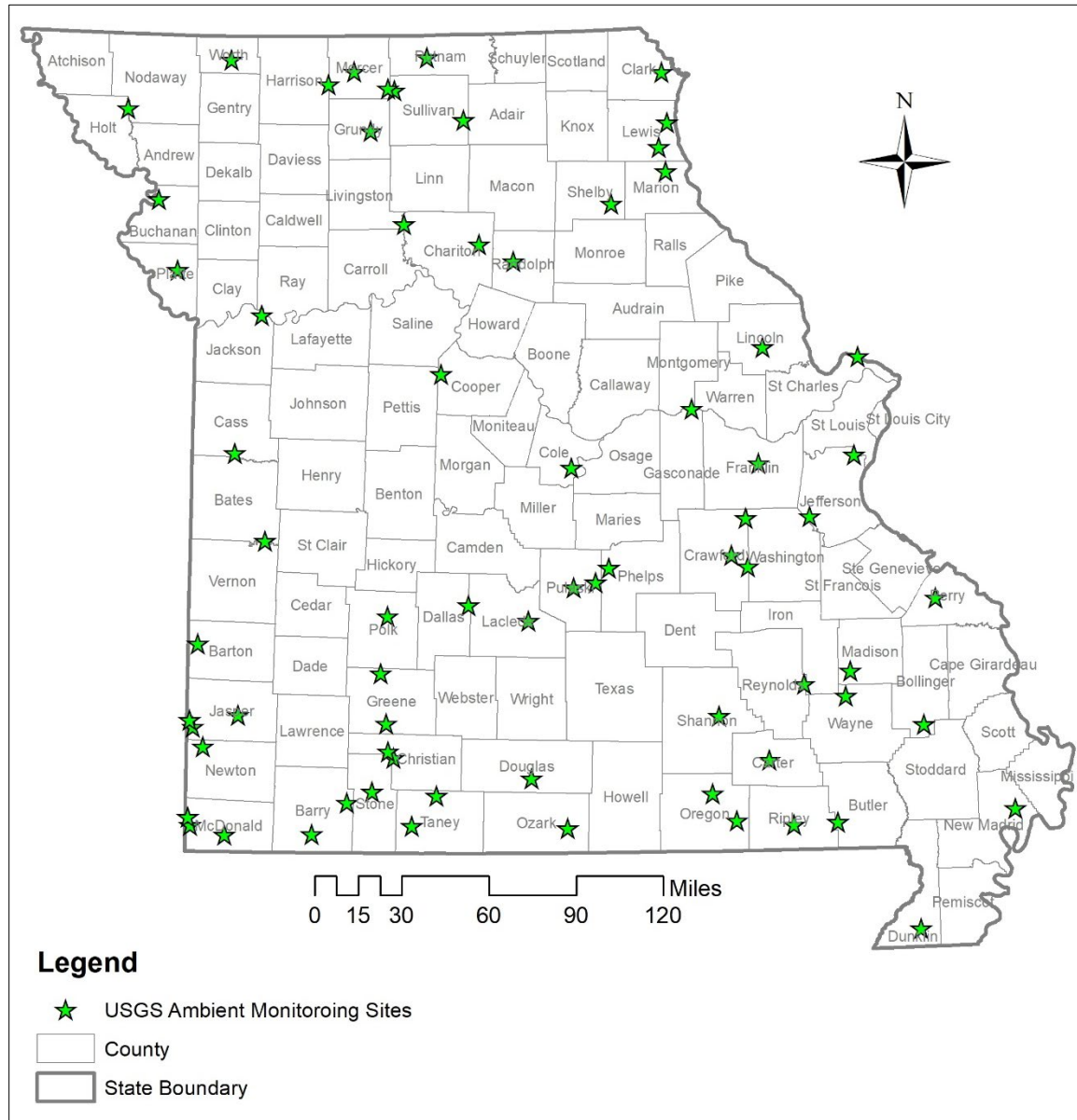
The table below provides a list of core and supplemental water quality indicators utilized by the state for assessing water quality monitoring needs.

	Protection of Aquatic Life	Recreation	Drinking Water Supply	Fish and Shellfish Consumption
Core Indicators	<ul style="list-style-type: none"> Quantitative Sampling of Aquatic Invertebrates Quantitative Sampling of Fish Qualitative Sampling of Invertebrates and Fish Habitat Assessment Flow Water Temperature Dissolved Oxygen pH Conductivity Sulfate Chloride TKN, NH₃-N, NO₂⁻-N + NO₃⁻-N Total P Dissolved. Al, Cd, Cu, Fe, Pb, Zn 	<ul style="list-style-type: none"> Fecal Coliform/<i>E. coli</i> Total N, Total P <p>For lakes only:</p> <ul style="list-style-type: none"> Secchi depth Chlorophyll VSS NVSS 	<ul style="list-style-type: none"> Dissolved As, Cd, Cu, Pb, Zn NO₂⁻-N+NO₃⁻-N Dissolved Solids <p>For lakes only:</p> <ul style="list-style-type: none"> Chlorophyll VSS NVSS Total N, Total P 	<ul style="list-style-type: none"> Pesticides PCBs Hg,Pb Dioxins Dibenzo Furans
Supplemental Indicators	<ul style="list-style-type: none"> Dissolved Co, Ni, Cr, Th Bioassay toxicity Pesticides 	<ul style="list-style-type: none"> Hazardous chemicals 	<ul style="list-style-type: none"> Taste and odor causing substances Dissolved Fe, Mn 	<ul style="list-style-type: none"> Heavy metals, PAHs

N = nitrogen, TKN = total kjeldahl nitrogen, NH₃ = ammonia, NO₂⁻ = nitrite, NO₃⁻ = nitrate, P = phosphorus, Al = aluminum, As = arsenic, Cd = cadmium, Ni = nickel, Cu = copper, Fe = iron, Pb = lead, Zn = zinc, Mn = manganese, Cr = chromium, Th = thorium, Hg = mercury, VSS = volatile suspended solids, NVSS = nonvolatile suspended solids, PCBs = polychlorinated biphenyls, PAHs = polycyclic aromatic hydrocarbons

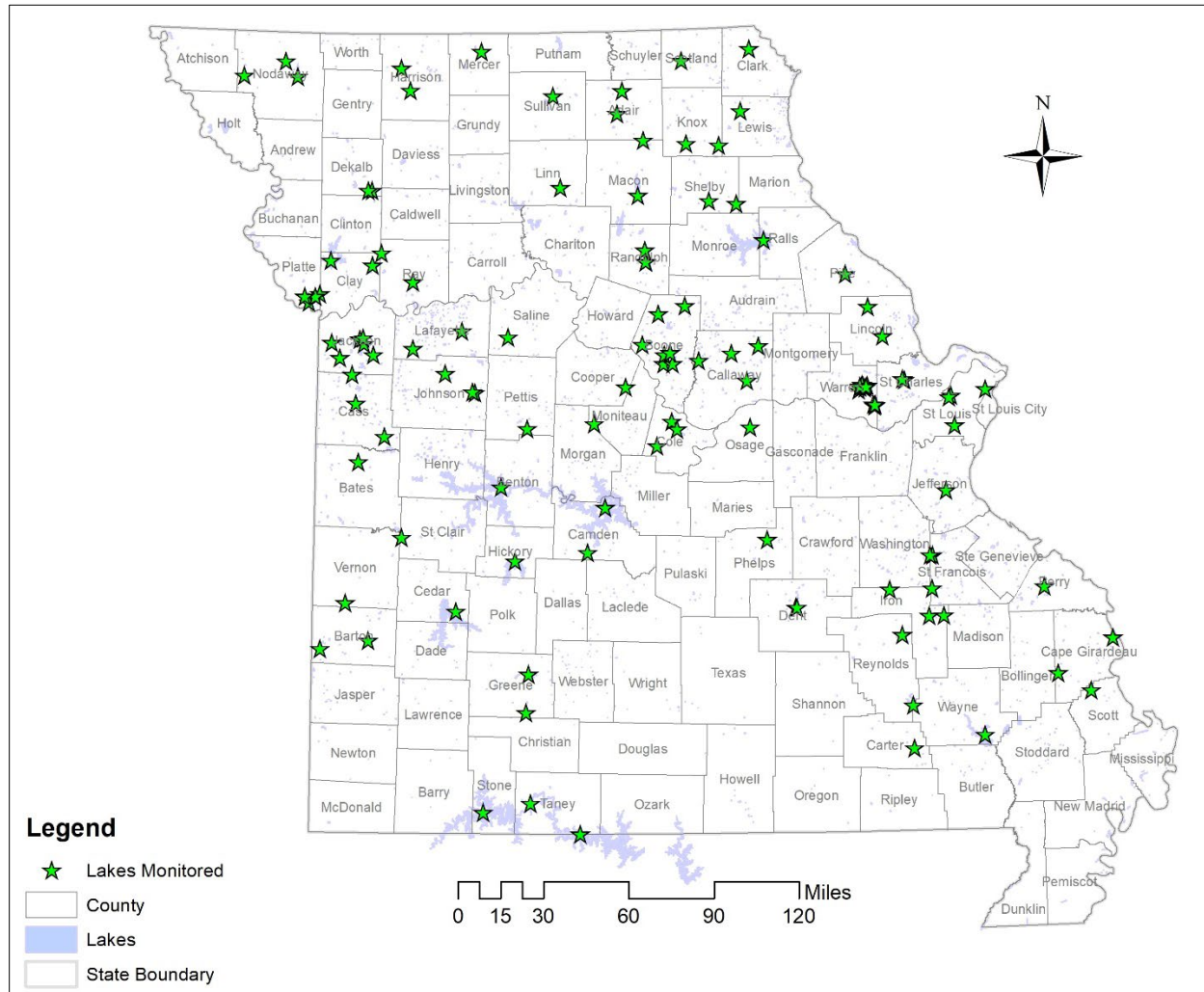
Appendix 10: U.S. Geological Survey fixed station ambient water quality monitoring sites.

The below map provides an overview of the current USGS fixed station ambient stream network which includes five spring sites.



Appendix 11: Lakes monitored by the Lakes of Missouri Volunteer Program and Statewide Lake Assessment Program.

The below map provides an overview of the lakes monitored by the University of Missouri-Columbia.



Appendix 12: Eligible agricultural and urban practices and the pollutants addressed.

The tables provide an overview of the commonly accepted agricultural and urban land management practices used to capture and treat runoff for nutrients, E. coli and pesticides.

Missouri Soil and Water Conservation Program		Practice Mode of Action*			Pollutants Addressed			
Resource Concerns and Associated Cost-Share Practices		Avoid	Control	Trap	Sediment	Nutrients	E. coli	Pesticide
Cost-Share #	Sheet/Rill and Gully Erosion	Sheet/Rill and Gully Erosion						
DSL-01	Permanent Vegetative Cover Establishment	x	x	x	x	x	x	x
DSL-02	Permanent Vegetative Cover Improvement	x	x	x	x	x	x	x
DSL-04	Terrace System		x	x	x	x		x
DSL-44	Terrace System with Tile		x		x	x		
DSL-05	Diversion		x		x	x		x
DSL-11	Permanent Vegetative Cover - Critical Area	x	x	x	x	x		x
DSL-111	Permanent Vegetative Cover - Critical Area: Confined Animal Feedlot	x	x	x	x	x	x	
DSL-15	No-Till System	x	x	x	x	x		x
DWC-01	Water Impoundment Reservoir		x	x	x	x		x
DWP-01	Sediment Retention, Erosion or Water Control Structure		x	x	x	x		x
DWP-03	Sod Waterway	x	x	x	x	x		x
N332	Contour Buffer Strips	x	x	x	x	x		x
N340	Cover Crop	x	x	x	x	x	x	x
N380	Windbreak/Shelterbelt Establishment	x	x	x	x	x		x
N410	Drop Pipe		x	x	x	x		
N585	Contour Stripcropping		x	x	x	x	x	x

Resource Concern and Associated Cost-Share Practices		Practice Mode of Action*			Pollutants Addressed			
		Avoid	Control	Trap	Sediment	Nutrients	E. coli	Pesticide
Cost-Share #	Grazing Management	Grazing Management						
DSP-02	Permanent Vegetative Cover Enhancement	x	x	x	x	x	x	
DSP 3.1	Grazing System Water Development		x		x	x	x	
DSP 3.2	Grazing System Water Distribution		x		x	x	x	
DSP 3.3	Grazing System Fence	x	x		x	x	x	
DSP 3.4	Grazing System Lime		x			x		
DSP 3.5	Grazing System Seed	x	x	x	x	x	x	
Cost-Share #	Irrigation Management	Irrigation Management						
N430	Irrigation Water Conveyance		x		x	x		x
N442	Irrigation System, Sprinkler	x			x	x		x
N443	Irrigation System, Surface and Subsurface		x		x	x		x
N447	Irrigation System, Tail Water Recovery		x		x	x		x
N554	Drainage Water Management		x	x	x	x		x
N587	Structure for Water Control		x	x	x	x		x
Cost-Share #	Animal Waste Management	Animal Waste Management						
N312	Beef Waste Management System	x	x			x	x	
N312	Dairy Waste Management System	x	x			x	x	
N312	Poultry Waste Management	x	x			x	x	
N312	Swine Waste Management	x	x			x	x	
N316	Incinerator	x	x			x	x	
N317	Composting Facility	x	x			x	x	
Cost-Share #	Nutrient and Pest Management	Nutrient and Pest Management						
N590	Nutrient Management	x	x		x	x	(x)	
N595	Pest Management	x	x					x

Resource Concern and Associated Cost-Share Practices		Practice Mode of Action*			Pollutants Addressed			
		Avoid	Control	Trap	Sediment	Nutrients	E. coli	Pesticide
Cost-Share #	Sensitive Areas	Sensitive Areas						
C650	Streambank Stabilization		X	X	X	X	X	
DSP-31	Sinkhole Improvement		X	X	X	X	X	X
BDSP-31	Buffer Sinkhole Improvement		X	X	X	X	X	X
N351	Well Decommissioning	X			X	X	X	X
N380	Windbreak/Shelterbelt Establishment	X	X	X	X	X		X
N386	Field Border		X	X	X	X	X	X
N391	Riparian Forest Buffer		X	X	X	X		
N393	Filter Strip		X	X	X	X	X	X
N574	Spring Development	X			X	X	X	
N725	Sinkhole Treatment	X	X	X	X	X	X	X
WQ10	Stream Protection	X	X	X	X	X	X	X
Cost-Share #	Woodland Erosion	Woodland Erosion						
C100	Timber Harvest Plan	X			X	X		
DFR-04	Forest Plantation	X			X	X		
N472	Livestock Exclusion	X			X	X	X	
N655	Restoration of Skid Trails, Logging Roads, Stream Crossings and Log Landings		X	X	X	X		

Note: The above table provides examples of the most commonly accepted practices employed in Missouri. This list doesn't preclude other practices that may be appropriate to specific projects or site conditions.

**Additional information can be found at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1187023.pdf*

(x) Included if management plan is for animal waste

Common Urban Land Management Practices	Practice Mode of Action			Pollutants Addressed			
	Avoid	Control	Trap	Sediment	Nutrients	E. coli	Pesticide
Urban	Urban						
Bioswale		x	x	x	x	x	
Detention basin		x	x	x	x	x	
Fertilizer management	x	x			x		
Enhanced infiltration (soil amendment)	x	x	x	x	x		
Irrigation management	x	x			x	x	x
Low impact landscaping	x			x	x		x
Pest management							x
Porous pavement		x	x		x	x	x
Rain garden		x	x	x	x	x	x
Rain water harvesting	x	x		x	x	x	
Other	Other						
Alum application		x	x		x		
Filter/buffer strip		x	x	x	x	x	x
Grade stabilization structure		x		x			
Grass seeding	x	x		x	x		
Habitat improvement	x	x		x	x	x	
On-site wastewater system upgrade		x			x	x	
Riparian restoration	x	x	x	x	x	x	x
Sediment control basin		x	x	x	x	x	
Sediment removal		x		x	x		
Shoreline stabilization		x		x	x		
Stream bank stabilization		x		x	x	x	
Water diversion	x	x		x	x		

Common Urban Land Management Practices	Practice Mode of Action			Pollutants Addressed			
	Avoid	Control	Trap	Sediment	Nutrients	E. coli	Pesticide
Other (continued)	Other						
Water retention basin		x	x	x	x	x	x
Well decommissioning	x				x	x	x
Wetland Restoration/Construction		x	x	x	x	x	x
Practice Facilitation	Practice Facilitation						
Conservation consultant							
Crop production deferment	x	x		x	x		x

Note: The above table provides examples of the most commonly accepted practices employed in Missouri. It is not meant to preclude other practices that may be appropriate to specific projects or site conditions.

Below are examples of other common NPS management practices that could be considered for planning and implemented. The selection of NPS management practices should be based upon the mode of action and the pollutants to be addressed.

Common Forestry Practices				
Argo Forestry Planning	Sediment Trap	Forest – Improved Harvest	Riparian Forest Buffer	Trail Closure/Improvements
Brush Barrier	Vegetated Filter Strip	Forest Chemical Management	Riparian Herbaceous Cover	Trees/Shrub Establishment
Check Dam	Clearing and Snagging	Forest Site Preparation	Road Construction and Management	Wetlands Forest Management
Grade Stabilization Structure Revegetation	Culverts and Cross-Ditches	Forest Stand Improvement	Streamside Management Areas	Woodland Improved Harvest
Riprap	Timber Harvesting	Forest Trails & Landings	Road Construction / Reconstruction	Woodland Pruning
Sediment Basin/Rock Dam	Fertilizer and Pesticide Application	Land Clearing Woodland	Road Management	Woody Root Pruning
Sediment Fence (Silt Fence)/Straw Bale Barrier	Forest – Direct Seeding	Revegetation of Disturbed Areas	Timber Harvesting	
Forest – Erosion Management	Riparian Buffers – Vegetative	Site Preparation and Forest Regeneration	Fire Management	
Wetland/Riparian Management				
Constructed Wetland	Riparian Forest Buffer	Riparian Buffers – Vegetative	Wetland Creation	Wetlands Acquisition - Protection
Restoration of Wetlands and Riparian Areas	Wetlands Forest Management	Riparian Herbaceous Cover	Wetland Enhancement	
Hydromodification/Habitat Alteration				
Stream Channel Restoration	Dam / Obstruction removal	Stream Corridor Improvement	Stream Crossing	Cut Bank Stabilization
Natural Channel Restoration	Instream and Riparian Habitat Restoration	Open Channel	Baffle Boxes	

Mining Operations				
Brush Barrier	Dust Control	Land Reclamation, Landslide Treatment	Outlet Stabilization Structure	Temporary Gravel Construction Access
Check Dam	Mulching	Land Reclamation, Toxic Discharge control	Paved Flume (Chute)	Temporary Excavated Grade Stabilization
Chemical Treatment	Anoxic Limestone Drains	Land Reconstruction, Abandoned Mine	Reclamation Runoff Diversion	Streambank Stabilization
Conveyance Measures	Grade Stabilization Structure	Land Reconstruction, Brine Damaged	Riprap	Surface Stabilization
Drop Inlet Protection	Grass-Lined Channel	Land Reconstruction, Currently Mined Land	Runoff Control and Sediment Basin/Rock Dam	Temporary Block
Temporary Fabric Drop Inlet Protection	Gravel Drop Inlet Protection	Level Spreader	Sediment Fence/Straw Bale Barrier Stream Protection	Temporary Slope Drain
Temporary Sod Drop Inlet Protection	Hardened Channel	Mine Shaft & Audit Closing	Sediment Traps and Barriers Sodding	Temporary Stream Crossing
Vegetated Filter Strip	Land Reclamation	Outlet Protection	Surface Roughening	Temporary and Permanent Seeding
Topsoil Replacement	Wetlands, Constructed	Wetlands, Natural and Restored		

Appendix 13: EPA allocation history and provisions for an exemption from the “50 percent watershed funding requirement for substantial state fund leveraging and waiver process.

The table below provides an overview of the state’s Section 319 NPS annual grant funding allocation between FY2013 through FY2019.

Federal Fiscal Year	National Allocation	Missouri’s Allocation	Project (pass through)	Program (PPG)
FY2013	\$155.9	\$3.433	\$1.716	\$1.716
FY2014	\$159.3	\$3.512	\$1.756	\$1.756
FY2015	\$158.2	\$3.499	\$1.749	\$1.749
FY2016	\$163.4	\$3.593	\$1.796	\$1.796
FY2017	\$167.9	\$3.717	\$1.858	\$1.858
FY2018	\$167.01	\$3.672	\$1.836	\$1.836
FY2019	\$165.34	\$3.636	\$1.818	\$1.818

Values represented are in millions of dollars

PPG = Performance Partnership Grants

The §319 grant funds received from EPA are allocated according to the most recent EPA §319 guidance and under one of the three provisions or processes described below:

50 Percent Watershed Funding Requirement for Substantial State Fund Leveraging

EPA recognizes and expects that all states devote and leverage significant nonfederal resources toward implementing their NPS management program. This is required through the 40 percent nonfederal match requirement for each §319 grant, and leveraging well beyond match is expected as a best practice for implementation of state NPS management programs. This expectation is articulated in EPA’s guidance *Key Components of an Effective State Nonpoint Source Management Program* (see Appendix 1). Most states routinely engage a wide array of state programs and agencies, federal programs, and local stakeholders in the implementation of their NPS programs, leveraging staff and funds to address NPS pollution problems. In fact, the §319 success stories demonstrate that this type of sustained partnership building and leveraging is foundational to achieving water quality results.

Exemption from 50 Percent Provision

A 50 percent exemption provision applies to states that go well beyond this expected level of funds leveraging. To encourage leveraging of Clean Water State Revolving Funds (SRF) and other state or local funding sources, the 2014 EPA NPS guidelines provide an exemption for states that invest substantial state and/or local funding towards NPS watershed project implementation. If a state qualifies for this exemption, federal watershed project funds allocated to the state may be used for the full range of activities to implement approved state NPS management programs, subject to these guidelines. To qualify for this exemption, states must demonstrate that state or local funding equivalent to the state’s total federal §319 allocation (i.e. twice the total amount of a state’s watershed project funds) will be used for implementing WBPs

or acceptable alternative plans. The watershed restoration and/or protection projects must align with the priorities described in the state NPS management program.

Consistent with the greater emphasis in these guidelines for watershed implementation, EPA wants to ensure that this exemption results in more on-the-ground implementation of watershed projects. If local funds are used to meet this exemption, the state must have mechanisms in place to ensure that projects will meet the goals of the watershed project funding requirements and be completed.

As expected with §319 funded projects, states must include all of the state or locally funded projects used to meet this exemption in the annual §319 grant work plans. Additionally, all state or locally funded projects used to meet this exemption must be reported in EPA's GRTS database in the same manner as §319 funded projects and all nationally-mandated elements are required for these projects.

No federal funds may be counted toward this leveraging exemption. However, "recycled" Clean Water SRF funds may be used after they have been loaned and paid back to the state (Note that Clean Water SRF funds can only be used for Clean Water SRF eligible activities). Other federal funding for NPS projects (e.g., USDA's Farm Bill) may not be used to meet this exemption. Nonfederal funds used to meet the required 40 percent match for the §319 grant award may not be used to meet this exemption.

Waiver Process

Circumstances may arise in which a state believes it has no choice but to develop and submit a work plan for a particular year that fails to meet one or more requirements in these guidelines. If such circumstances arise and the state believes the circumstances justify a waiver from one or more requirements in these guidelines, the state may submit a request for a waiver to the EPA regional water division director. The request should identify: 1) the requirement from which a waiver is requested; 2) the circumstances requiring the waiver (explaining why the waiver is necessary to successfully implement the approved state NPS management program); 3) a description of the activities and projects that the state will be implementing in lieu of those required by these guidelines; and 4) a commitment to adhere to the guidelines to the greatest extent possible. The regional division director may approve the waiver for the year requested with the concurrence of the NPS national program manager in EPA's Office of Water.

The waiver provision is intended for use only in unusual circumstances. For example, a waiver may be considered if national §319 funding levels are substantially reduced and compliance with the guidelines would result in substantially less environmental benefits (nonpoint source pollution reductions) than the state's proposed alternative use of the funds.

This waiver process applies only to the requirements established by these guidelines. It does not apply to any statutory or regulatory requirements or requirements in the EPA orders or policies referenced in these guidelines.